D.G. BIDDLE & ASSOCIATES
CONSULTING ENGINEERS & PLANNERS

96 King Street East
Oshawa, ON L1H 1B6
905-576-8500
dgbiddle.com

FUNCTIONAL SERVICING AND STORMWATER MANAGEMENT REPORT

FOR

HILL STREET DEVELOPMENTS INC.
OSACA DRAFT PLAN

5868 COUNTY ROAD 65
PART OF LOT 27, CONCESSION 5
MUNICIPALITY OF PORT HOPE
COUNTY OF NORTHUMBERLAND

PROJECT NO. 122049

DATE: January 2025

February 21, 2023

Rev: January 28, 2025

Hill Street Developments Inc.
2015 Altona Road
Pickering, ON
L1V 1M8

Attention: Mr. Larry MacDonell

Re: Functional Servicing and Stormwater Management Report
5868 County Road 65, Osaca
Municipality of Port Hope
Zoning By Law Amendment Application (ZB02-2023)
Draft Plan of Subdivision Application (SU01-2023)
Our File: 122049

Dear Sir:

In support of the Draft Plan of Subdivision and Zoning By Law Amendment applications for the above reference proposal, we herewith submit the following Functional Servicing and Stormwater Management Report. This report has been prepared to identify the method in which the proposed development will meet the stormwater management requirements for the Municipality of Port Hope, Northumberland County and Ganaraska Region Conservation Authority and identify the infrastructure required to service the proposed development.

We trust the Municipality of Port Hope will concur with our recommendations. Please provide positive comments on the Draft Plan of Subdivision to facilitate development. Should you have any questions on the foregoing, please do not hesitate to contact our office.

Yours Truly,
D.G. Biddle & Associates Limited

Matt Holmes, P. Eng.
Junior Engineer
Civil Group

MJH/mjh
Encl.
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1.0 INTRODUCTION

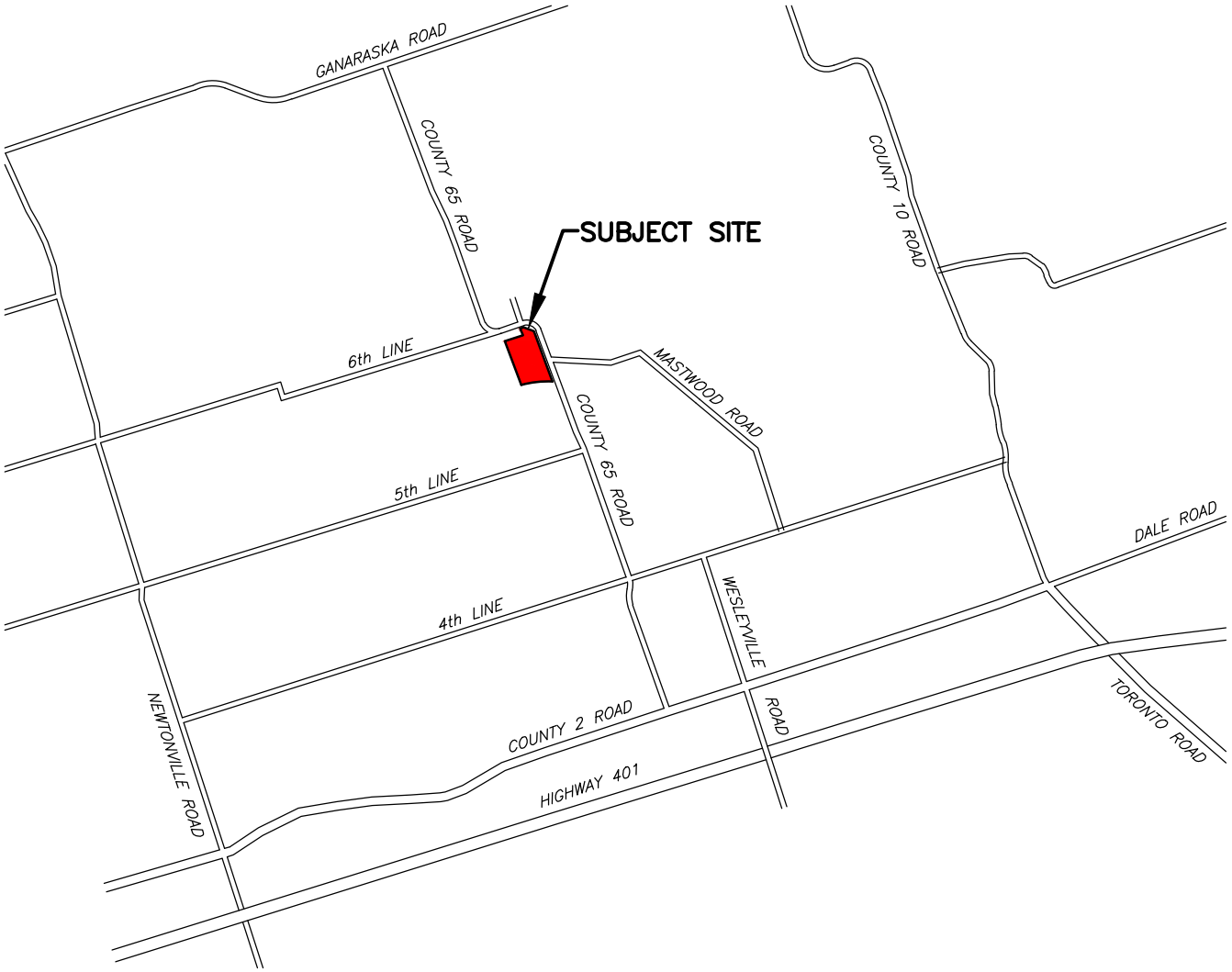
1.1 Purpose

This Functional Servicing and Stormwater Management Report has been prepared to recommend and illustrate the infrastructure required to provide municipal services for the prepared Draft Plan of Subdivision (SU01-2023) which will meet the results of the Municipality of Port Hope, Northumberland County & GRCA. It will address sanitary services, watermain services, stormwater drainage works, and site grading required to proceed with the development. This report will also discuss the stormwater quality and quantity control objectives in accordance with the requirements of the local governing authorities.

1.2 Site Location and Description

The subject property is located on the west side of County Road 65 within the Hamlet of Osaca located at 5868 County Road 65 in the Rural Area of the Municipality of Port Hope. The proposed development is bounded on the north and south by existing resident lands, west by agricultural/residential lands and on the east by County Road 65. A Site Location Plan is attached as Figure 1.

The proposed development straddles a highpoint running east to west and divides the drainage into two areas flowing to two unnamed creeks. The southerly drainage area sheet flows south to an unnamed creek, south of the property which then flows to the east across County Road 65 via an existing culvert. The northerly drainage area consists of an unnamed creek flowing west to east through the property. All drainage from the northerly drainage area flows to the unnamed creek which ultimately flows to the east across County Road 65 via an existing culvert. The Pre-Development Drainage scheme is illustrated on the Pre-Development Storm Drainage Plan, drawing 122049-SD-1.



5868 COUNTY ROAD 65, PORT HOPE, ON

SITE LOCATION PLAN

D.G. BIDDLE & ASSOCIATES
CONSULTING ENGINEERS & PLANNERS

96 King Street East
Oshawa, Ontario, L1H 1B6
Phone: 905-576-8500
info@dgbiddle.com
dgbiddle.com

SCALE	N.T.S.
DRAWN	M.J.H.
DESIGN	M.J.H.
CHECKED	B.J.L.
DATE	JAN 2023

PROJECT 122049

DWG FIG 1

2.0 WATER SUPPLY & DISTRIBUTION

2.1 Existing System

Currently, the site is not serviced with a connection to a municipal water system. There is no municipal water infrastructure present on County Road 65.

2.2 Proposed System

The domestic and firefighting water will be provided privately on-site. Domestic water supply for each dwelling will be supplied by individual water wells located on each lot installed by a well driller who has been licensed by the Ministry of Environment and Climate Change. On-site firefighting water supply will be provided through the implementation of a dry hydrant system and underground water supply tank located on Block 41. The dry hydrant system has been designed in accordance with the Ontario Building Code.

The layout of the dry hydrant system is illustrated on the Site Servicing Plan (Drawing 122049 SS-1) attached at the end of this report. Supporting calculations are appended in Schedule 1.

3.0 SANITARY SERVICING

3.1 Existing System

Currently, the site is not serviced with a connection to a municipal sanitary system. There is no municipal sanitary infrastructure present on County Road 65.

3.2 Proposed System

Individual on-site septic systems will provide treatment of the sanitary sewage from the proposed dwellings. Detailed sizing of the individual septic systems will occur at building permit submission.

The approximate layout of the proposed individual septic systems is illustrated on the Conceptual Grading and Servicing Plan, drawing 122049 LG-1, attached at the end of this report.

4.0 STORM SERVICING

4.1 Existing System

Currently, the site is not serviced with a connection to a municipal storm system. There is no municipal storm infrastructure present on County Road 65.

4.2 Proposed System

The stormwater runoff will continue to the two unnamed creeks using an open ditch drainage conveyance system which will flow into two stormwater management facilities located in Blocks 39 & 40. The open ditch drainage system will include the use of culverts to maintain positive drainage to the stormwater facilities prior to discharging to the unnamed creeks.

The proposed stormwater drainage system is illustrated on the attached Conceptual Grading and Servicing Plan, drawing 122049 LG-1, attached at the end of this report.

5.0 PERMANENT STORMWATER QUALITY CONTROLS

The overall drainage pattern of the subject site, in post development conditions, flows to different unnamed creeks on the north and south sides of the development. This follows the similar drainage pattern in pre-development conditions as the lands currently straddles a highpoint, which effectively splits the drainage to the north and south. The unnamed creeks are administered by the Ganaraska Region Conservation Authority (GRCA) and will require protection from increased erosion, sedimentation and degradation of water quality. Therefore, water quality controls will be implemented to the tributary areas for the north and south development to achieve Level 1 Enhanced protection.

The Storm Water Management Practices Planning and Design Manual (March 2003) recommends end of pipe facilities for areas larger than 5ha. The proposed development does not encompass a significant developable area, considering these lands will primarily be estate lots fronting local roads. The northern developable area to be considered is approximately 4.00ha in size and the southern developable area

to be considered is approximately 1.10ha in size, as shown on drawing 122049-SD-2. It should be noted, there are additional developable areas within the subject site however, these remaining additional areas primarily consist of the estate's rear yards or is open space with little to no impact to drainage. Due to the relatively small size of the considered development to the north and south, a treatment train approach has been proposed to provide stormwater quality controls.

5.1 North Drainage Area

The northern drainage area will primarily drain to a stormwater management pond located in the northeast corner of development, Block 39 on the Draft Plan, prior to discharging into the unnamed creek. Although the tributary to the pond is approximately 4.00ha, a dry pond was requested by the Municipality of Port Hope.

Typically, enhanced level one water quality control is provided through the implementation of a wet pond. The Municipality of Port Hope noted the Works and Engineering Department is not supportive of two (2) wet stormwater management ponds for the 40-home development's stormwater management strategy due to the maintenance requirements/cost. It should also be noted that GRCA will not allow Low Impact Development (LID) techniques as a sole stormwater management effort. Considering the above, a dry pond is proposed in Block 39 at the northeastern corner of the development. Since dry ponds do not provide the 80% Total Suspended Solids (T.S.S.) removal required, a stormceptor manhole, EF-4 has been sized as part of the water treatment train approach to ensure 80% T.S.S. removal for the proposed flows entering Pond A. The stormceptor is to be installed upstream of the pond inlet.

To further reduce maintenance concerns from the Municipality of Port Hope, the ponds have been oversized to store 20 years of sediment to reduce the frequency of cleaning. The annual sediment loading volumes have been determined using Table 6.3 in the MOE SWM Planning and Design Manual, March 2003. For Pond A, there is 4.00ha draining to the pond at a percent impervious of 25.96%. Being conservative on the estimate, 35% imperviousness was used, or 0.60m^3/ha of sediment yearly. The

annual sediment loading requirements as per the MOE guidelines are shown below in Table 1:

Table 1 – Annual Sediment Loading (Pond A)

Impervious Level	Total Drainage Area (ha)	Annual Loading (m^3/ha)	Maintenance Years	20 Year Sediment Volume Required (m^3)
25.96%	4.00	0.60	20	47.95

Access to the pond will be provided by a 3.0m wide maintenance access from Street A to the Pond Block. The minor and major flows will be accommodated within the right of ways and all overland flow routes have been sized to ensure no flooding on private property will occur.

5.1.1 Quality Control Dry Pond

The drainage area tributary to the pond is under the minimum 5ha tributary area requirements for a wet pond, therefore, a dry pond is proposed to facilitate water quality control. Although a dry pond's primary purpose is for the attenuation of post-development peak flows, the pond does have characteristics which assist in providing stormwater quality controls. The pond has been designed with a flat bottom which will allow for the settlement of sediment and promote the infiltration of water. The proposed outlet for the pond will be a Hickenbottom structure which will consist of a perforated structure with a vertical 1200mm CSP riser and 25mm diameter perforations. The CSP riser is also proposed to be surrounded by 25-50mm clear stone. The perforated riser and surrounding clear stone will have the secondary benefit of reducing the velocity of the stormwater and helping to promote the settling of sediment prior to release.

It is a requirement of Table 4.8: Dry Pond (Continuous Flow) – Summary of Design Guidance from the Ministry of Environment's Stormwater Management Planning and Design Manual (March 2003), that the minimum orifice size be 75mm for dry ponds.

With a 100mm orifice, Pond A located in Block 39 will have a drawdown time of 25.12 hours based on Equation 4.10 from the MOE 2003 manual.

Pond sizing requirements are based on the type of pond and impervious level of the development. The drainage area to stormwater management pond A is 4.00ha as illustrated on drawing 122049-SD-2. Since the development consists of estate lots and an open block, the impervious level was calculated based on a weighted runoff coefficient for each drainage catchment. Weighted runoff supporting calculations are appended in Schedule 1. The catchment draining to the stormwater facility located in Block 39 has a calculated percent impervious of 25.96%. Culvert sizing calculations to convey drainage to Pond A are appended at the end of the report.

5.1.2 Water Quality Discharge Structure

The design proposed for the pond quality discharge structure will be a Hickenbottom structure which outlets to an 1800mm manhole before it ultimately outlets at existing grade at the property line via the proposed headwall to Block 42. The 1800mm manhole will include a cast-in-place concrete wall with one opening which will be covered by an orifice plate to control discharge. A 100mm orifice will be placed with an invert of 162.70m (centerline elevation of 162.75m). The 1800mm manhole will have a weir with an invert of 163.00m to aid in the discharge of flows from the structure. The discharge structure has been designed surrounded by rip rap which will aid in the removal of sediment from the water prior to discharging to the Open Space Block, Block 42.

Details of the water quality discharge structures are illustrated on the Conceptual grading and Servicing Plan, drawing 122049-LG-1. Calculations for the water quality discharge structure orifice sizing can be found in Schedule 1.

5.1.3 Lot Levels Controls

It is recommended that roof water leaders from the dwellings be discharged to grassed areas throughout the area. The drainage characteristics of the lots are beneficial for the

extended contact of stormwater runoff and the promotion of stormwater infiltration. The side yard swales and rear yard sheet flow are conducive to the settling of sediment.

There will also be 4 infiltration galleries within the tributary to promote groundwater recharge and which will also mitigate nitrate runoff. The infiltration galleries will be filled with 100mm diameter stone, wrapped in filter cloth. This is further discussed in Section 7 below.

5.2 South Drainage Area

Typically, enhanced level one water quality control is provided through the implementation of a wet pond. The Municipality of Port Hope noted the Works and Engineering Department is not supportive of two (2) stormwater management ponds for the 40-home development's stormwater management strategy and one is currently proposed for the northern drainage area. It should also be noted that GRCA will not allow Low Impact Development (LID) techniques as a sole stormwater management effort. In light of the above, a dry pond is proposed in Block 40 at the south eastern corner of the development. Since dry ponds do not provide the 80% Total Suspended Solids (T.S.S.) removal required, a stormceptor manhole, EF-4 has been sized as part of a water treatment train approach to ensure 80% T.S.S. removal for the proposed flows entering to Pond B. The stormceptor is to be installed upstream of the pond inlet to reduce suspended solids entering the pond, thereby reducing the overall maintenance of the pond.

To further reduce maintenance concerns from the Municipality of Port Hope, the ponds have been oversized to store 20 years of sediment to reduce the frequency of cleaning. The annual sediment loading volumes have been determined using Table 6.3 in the MOE SWM Planning and Design Manual, March 2003. For Pond B, there is 1.10ha draining to the pond at a percent impervious of 38.73%. Interpolating between 35% and 55%, a value of 0.84m3/ha was used for the annual sediment loading. The annual sediment loading requirements as per the MOE guidelines are shown below in Table 2:

Table 2 – Annual Sediment Loading (Pond B)

Impervious Level	Total Drainage Area (ha)	Annual Loading (m^3/ha)	Maintenance Years	20 Year Sediment Volume Required (m^3)
38.73%	1.10	0.84	20	18.59

Access to the pond will be provided by a 3.0m wide maintenance access from Street A to the pond block. The minor and major flows will be accommodated within the right of ways and all overland flow routes have been sized to ensure no flooding on private property will occur.

5.2.1 Quality Control Dry Pond

The drainage area tributary to the pond is significantly under the minimum 5ha tributary area requirements for a wet pond, therefore a dry pond is proposed to facilitate water quality. Although the dry pond's primary purpose is for the attenuation of post-development peak flows, the pond does have characteristics which assist in providing stormwater quality controls. The pond has been designed with a flat bottom which will allow for the settlement of sediment and promote the infiltration of water. The proposed outlet for the pond will be a Hickenbottom structure which will consist of a perforated structure with a vertical 1200mm CSP riser and 25mm diameter perforations. The CSP riser is also proposed to be surround by 25-50mm clear stone. The perforated riser and surrounding clear stone will have the secondary benefit of reducing the velocity of the stormwater and helping to promote settling of sediment prior to release.

It is a requirement of Table 4.8: Dry Pond (Continuous Flow) – Summary of Design Guidance from the Ministry of the Environment's Stormwater Management Planning and Design Manual (March, 2003), that the minimum orifice size be 75mm for dry ponds. With a 90mm orifice, Pond B located in Block 40 will have a drawdown time of 39.59 hours based on Equation 4.10 from the MOE 2003 manual.

Pond sizing requirements are based on the type of pond and impervious level of the development. The drainage area to stormwater management pond B is 1.10ha as illustrated on drawing 122049-SD-2. Since the development consists of estate lots and

an open block, the impervious level was calculated based on a weighted runoff coefficient for each drainage catchment. Weighted runoff supporting calculations are appended in Schedule 1. The catchment draining to the stormwater facility in Block 40 has a calculated percent impervious of 38.73%. Culvert sizing calculations to convey the drainage into Pond B are appended at the end of the report.

5.2.2 Water Quality Discharge Structure

The design proposed for the pond quality discharge structure will be a Hickenbottom structure which outlets to a 1200mm manhole before it ultimately outlets at existing grade at the property line via the proposed headwall along County Road 65. The 1200mm manhole will include a cast in place concrete wall with one opening which will be covered by an orifice plate to control discharge. A 90mm orifice will be placed with an invert of 162.00m (centerline elevation of 162.05m). The discharge structure has been designed surrounded by riprap which will aid in the removal of sediment from the water prior to discharge to the ditch along County Road 65.

Details of the water quality discharge structures are illustrated on the Conceptual Grading and Servicing Plan, drawing 122049-LG-1. Calculations for the water quality discharge structure orifice sizing can be found in Schedule 1.

5.2.3 Lot Levels Controls

It is recommended that roof water leaders from the dwellings be discharged to grassed areas throughout the area. The drainage characteristics of the lots are beneficial for the extended contact of stormwater runoff and the promotion of stormwater infiltration. The side yard swales and rear yard sheet flow are conducive to the settling of sediment.

There will also be 4 infiltration galleries within the tributary to promote groundwater recharge and which will also mitigate nitrate runoff. The infiltration galleries will be filled with 100mm diameter stone, wrapped in filter cloth. This is further discussed in Section 7 below.

6.0 PERMANENT STORMWATER QUANTITY CONTROLS

6.1 North Drainage

As mentioned previously, the proposed stormwater management pond will provide quantity controls in addition to quality controls as outlined above. The GRCA design criteria states that the post-development release rates are to be attenuated to the pre-development release rates for each of the 2 through 100-year storm events. The residential lot fabric is tributary to 2 distinct drainage areas prior to discharging off-site. The stormwater management pond discussed in this section is tributary to the flows draining to the northern creek.

6.1.1 Pre-Development Hydrology

As illustrated on the Pre-Development Drainage Scheme, SD-1, the pre-development drainage area draining to the northern creek is 16.93ha. Using the NASHYD Sub-routine of the computer program VISUAL OTTHYMO 6.0, pre-development peak flows were computed using the Port Hope Rainfall intensity for the 2, 5, 10, 25, 50 and 100-year storm events. The results for the pre-development flows are tabulated below in the next section.

6.1.2 Post Development Hydrology

The post-development flow has been modelled using a 4-hour Chicago distribution rainfall event. The STANDHYD subroutine was used to simulate the impervious surfaces of the site and calculate the post-development flows from the site. The drainage catchments were modelled with weighted runoff coefficients to calculate the percent imperviousness individually. Supporting calculations are appended in Schedule 1. The results are tabulated in Table 3 below.

The quantity control storage volume of approximately 1,692m^3 (excludes the erosion volume of 377m^3) is achieved through the excavation and berming of the pond to an elevation of 163.97. This provides approximately 0.30m free-board above the anticipated 100-year water surface elevation of the pond. The maximum required volume is 1,580m^3. Through the implementation of the gravity draw pipe and manhole complete with an orifice plate and weir wall, the proposed stormwater management pond will attenuate post-development peak flows to the pre-development levels. The ROUTE RESERVOIR Sub-Routine of HYMO 6.0 was used to simulate the performance of the pond. A comparison of pre- to post-

development flows are tabulated below. The OTTHYMO Summary Files are attached in Schedule 2.

TABLE 3 – BLK 39 POND PRE- & POST-DEVELOPMENT PEAK FLOWS

RETURN FREQUENCY (Years)	PRE-DEV. PEAK FLOW (4hr CHICAGO)	POST- DEVELOPMENT FLOW (4hr CHICAGO)		
	*FLOW LEAVING SITE (m^3/s)	**UNCONTROLLED FLOW LEAVING SITE (m^3/s)	+ATTENUATED FLOW LEAVING SITE (m^3/s)	++TOTAL FLOW TO NORTH CREEK (m^3/s)
2	0.193	0.138	0.024	0.158
5	0.362	0.261	0.050	0.310
10	0.477	0.343	0.066	0.408
25	0.844	0.609	0.202	0.803
50	1.069	0.793	0.276	1.048
100	1.317	0.990	0.355	1.309

*Refer to Figure 10 (Appendix 2) Node 1 ** Refer to Figure 12 (Appendix 2) Node 13

+ Refer to Figure 12 (Appendix 2) Node 10 ++ Refer to Figure 12 (Appendix 2) Node 14

As reported above, all post-development peak flows up to and including the 100-year return frequency event will be attenuated to the pre-development flow rates. Therefore, no adverse impact to the downstream receiving watercourse is anticipated.

6.2 South Drainage

As mentioned previously, the proposed stormwater management pond will provide quantity controls in addition to quality controls as outlined above. The Ganaraska Region Conservation Authority (GRCA) design criteria states that the post-development release rates are to be attenuated to the pre-development release rates for each of the 2 through 100-year storm events. The residential lot fabric is tributary to 2 distinct drainage areas prior to discharging off-site. The stormwater management pond discussed in this section is tributary to the flows draining to the southern creek.

6.2.1 Pre-Development Hydrology

As outlined above, the drainage for the proposed development is divided into two areas draining to two unnamed creeks. As illustrated on the Pre-Development Drainage Scheme,

SD-1, the pre-development drainage area draining to the southern creek is 13.87ha. Using the NASHYD Sub-routine of the computer program VISUAL OTTHYMO 6.0, pre-development peak flows were computed using the Port Hope Rainfall intensity for the 2, 5, 10, 25, 50 and 100-year storm events. The results for the pre-development flows are tabulated below in the next section.

6.2.2 Post Development Hydrology

The post-development flow has been modelled using a 4-hour Chicago distribution rainfall event. The STANDHYD subroutine was used to simulate the impervious surfaces of the site and calculate the post-development flows from the site. The drainage catchments were modelled with weighted runoff coefficients to calculate the percent imperviousness individually. Supporting calculations are appended in Schedule 1. The results are tabulated in Table 4 below.

The quantity control storage volume of approximately 990m^3 is achieved through the excavation and berming of the pond to an elevation of 163.30. This provides approximately 0.48m free-board above the anticipated 100-year water surface elevation of the pond. The maximum required volume is 746m^3. Through the implementation of the gravity draw pipe and manhole complete with an orifice plate, the proposed stormwater management pond will attenuate post-development peak flows to the pre-development levels. The ROUTE RESERVOIR Sub-Routine of HYMO 6.0 was used to simulate the performance of the pond. A comparison of pre- to post-development flows are tabulated below. The OTTHYMO Summary Files are attached in Schedule 2.

TABLE 4 – BLK 40 POND PRE- & POST-DEVELOPMENT PEAK FLOWS

RETURN FREQUENCY (Years)	PRE-DEV. PEAK FLOW (4hr CHICAGO)	POST- DEVELOPMENT FLOW (4hr CHICAGO)		
	*FLOW LEAVING SITE (m^3/s)	**UNCONTROLLED FLOW LEAVING SITE (m^3/s)	+ATTENUATED FLOW LEAVING SITE (m^3/s)	++TOTAL FLOW LEAVING SITE (m^3/s)
2	0.119	0.113	0.007	0.119
5	0.225	0.211	0.008	0.218
10	0.295	0.279	0.009	0.287
25	0.525	0.494	0.010	0.503
50	0.679	0.612	0.011	0.621
100	0.846	0.746	0.013	0.755

*Refer to Figure 10 (Schedule 2) Node 2 ** Refer to Figure 11 (Schedule 2) Node 7

+ Refer to Figure 11 (Schedule 2) Node 6 ++ Refer to Figure 11 (Schedule 2) Node 8

As reported above, all post-development peak flows up to and including the 100-year return frequency event will be attenuated to the pre-development flow rates. Therefore, no adverse impact to the downstream receiving watercourse is anticipated.

7.0 INFILTRATION REQUIREMENTS

D.M. Wills was retained by the client to complete the water balance nitrate threshold study for the development. To ensure the development meets the nitrate threshold, the net result is that 38 lots, a park block, and 2 stormwater management pond blocks can be developed through the implementation of infiltration galleries. Table 5 below illustrates the volume required in each catchment, as provided by D.M. Wills and the volume provided from the galleries. Supporting calculations and a scheme outlining D.M. Wills' catchments are appended in Appendix 1.

TABLE 5 – INFILTRATION GALLERIES

CATCHMENT	AREA (ha)	STONE VOLUME REQUIRED (m^3)	STONE VOLUME PROVIDED (m^3)	DIMENSIONS (LxWxD) (m)
3A/3B	1.45	210.00	210.38	41.25 x 4.25 x 1.20
9A	1.05	120.00	120.60	33.50 x 3.00 x 1.20
9B	2.07	60.00	60.30	16.75 x 3.00 x 1.20
9C	0.48	100.00	102.00	20.00 x 4.25 x 1.20

8.0 SITE GRADING

In general, the site will be graded in a manner which will satisfy the following goals:

- Satisfy the Municipality of Port Hope boulevard and road grading criteria including:
- Minimum Road Grade: 0.5%
- Maximum Road Grade: 5.0%
- Minimum Landscape Area Grade: 1.0%
- Maximum Landscape Area Grade: 5.0%
- Provide continuous grades for overland flow conveyance.
- Minimize the volume of earth to be moved and minimize cut/fill differential.
- Achieve stormwater management objectives required for the site.

Details of the site grading design is illustrated on the Conceptual Grading and Servicing Plan, drawing 122049 LG-1, attached at the end of this report.

9.0 EROSION & SEDIMENT CONTROL

During the construction period, the removal of natural vegetation causes the transport of large amounts of sediment during rainfall events. To minimize the sediment laden storm water leaving the site during construction, the following sediment control techniques are proposed to be implemented. These measures are detailed on the Erosion and Sediment Control Plan included in the site plan submission.

1. Construction Vehicle Access Route (Mud Mat)
2. Rock Check Dams
3. Perimeter Enviro Fence
4. Good Engineering Practices

The above techniques will be detailed on the Erosion and Sediment Control Plan (122049 Drawing ES-1).

10.0 CONCLUSIONS

The preceding report identifies the functional servicing and stormwater management requirements for the development proposal. The investigations into these requirements have resulted in the following conclusions for the development proposal:

- Sanitary servicing for each dwelling will be provided through individual septic systems on each lot. Detailed sizing of the individual septic systems will occur during the building permit process.
- On-site firefighting water supply will be provided through the implementation of a dry hydrant system and on-site underground water supply tank;
- Domestic water supply for each dwelling will be supplied by individual water wells located on each lot installed by a well driller who has been licensed by the Ministry of Environment and Climate Change;
- A combination of formal end of pipe stormwater treatment facility for runoff quantity controls and infiltration galleries are proposed on-site. LID techniques are to be implemented as illustrated on the engineering drawings to assist in offsetting the nitrate level increase in stormwater runoff. LID measures are not to be used in the site's water quantity control strategy;
- Stormwater quality controls are implemented through the use of open ditches, end of pipe stormwater treatment facilities and the infiltration galleries located in the ditches as illustrated on drawing 122049-LG-1;
- Temporary sediment controls during construction can be managed by the use of perimeter enviro fence, construction vehicle access route, rip rap check dams and good engineering practices;

APPENDIX 1

GRCA RAINFALL INTENSITY FORMULAS

PRE-DEVELOPMENT TIME OF CONCENTRATION CALCULATIONS

POST-DEVELOPMENT TIME OF CONCENTRATION CALCULATIONS

POST-DEVELOPMENT WEIGHTED RUNOFF COEFFICIENT CALCULATION

STAGE-STORAGE DISCHARGE CALCULATIONS (BLK 39 – POND A)

STAGE-STORAGE DISCHARGE CALCULATIONS (BLK 40 – POND B)

CULVERT SIZING CALCULATIONS & DESIGN CHARTS

INFILTRATION REQUIREMENTS

FIRE FIGHTING CALCULATIONS

STORMCEPTOR SIZING REPORTS

Clarington Intensity Formulas

IDF Equation	I =a/(b+Td)		Td --- Time in hour I -- Intensity in mm/Hr				Conservative a i = --------- (td + b)^c
Return Period Parameters	2 year	5 year	10 year	25 year	50 year	100 year	100year
a	1778	2464	2819	3886	4750	5588	1770
b	13	16	16	18	24	28	4
							0.82

Rainfall Intensity Formulas (beyond Clarington)

Yarnell Equation

	I =a/(b+Td)		Td --- Time in hour I -- Intensity in mm/Hr			
Return Period Parameters	2 year	5 year	10 year	25 year	50 year	100 year
a	1778	2464	2819	3886	4750	5588
b	13	16	16	18	24	28

Job #: 122049

Time of Concentration & Time to Peak Calculation (Pre-Development)

1)	Pre-Dev to Southern Creek		Slope =	164.20-161.92 / 461.61	=	0.49%
	Upstream Invert	164.20				
	Downstream Invert	161.92	**From Figure A.5.2 : Upland Method for Estimating Tc**			
	Length (m)	461.61	**(SCS National Engineering Handbook, 1971)**			
	Assume Pasture		v =	0.16 m/s		
			t_c =	461.61 / 0.16	=	2885.07 s
	Visual Otthymo Node 2				=	0.80 h
			t_{p1} =	$2 \times t_c / 3$	=	0.53 h

2)	Pre-Dev to Northern Creek		Slope =	170.00-162.83 / 323.00	=	2.22%
Part 1	Upstream Invert	170.00				
	Downstream Invert	162.83	**From Figure A.5.2 : Upland Method for Estimating Tc**			
	Length (m)	323.00	**(SCS National Engineering Handbook, 1971)**			
	Assume Woodland, Fallow Contour		v =	0.24 m/s		
			t_c =	323.00 / 0.24	=	1331.96 s
	Visual Otthymo Node 1				=	0.370 h
			t_{p1} =	$2 \times t_c / 3$	=	0.247 h

Part 2			Slope =	162.83-157.61 / 327.87	=	1.59%
	Upstream Invert	162.83				
	Downstream Invert	157.61	**From Figure A.5.2 : Upland Method for Estimating Tc**			
	Length (m)	327.87	**(SCS National Engineering Handbook, 1971)**			
	Assume Grassed Waterway		v =	0.57 m/s		
			t_c =	327.87 / 0.57	=	575.20 s
	Visual Otthymo Node 1				=	0.160 h
			t_{p2} =	$2 \times t_c / 3$	=	0.107 h

$t_{p\ TOTAL}$ = $t_{p1} + t_{p2}$ = 0.353 h

Time of Concentration & Time to Peak Calculation (Post-Development)

1) Rear Lots & BLK 42 Draining South

Upstream Invert 163.69
Downstream Invert 162.41
Length (m) 169.88
Assume Woodland

Visual Otthymo Node 5

Slope = (163.69-162.41) / 169.88 = 0.75%

From Figure A.5.2 : Upland Method for Estimating Tc
(SCS National Engineering Handbook, 1971)

v = 0.13 m/s

t_c = 169.88 / 0.13 = 1306.77 s = 0.363 h

t_p = 2 x t_c / 3 = 0.242 h

2) Street A & Lots Draining to CR65

Upstream Invert 163.93
Downstream Invert 163.29
Length (m) 69.55
Assume Cultivated Straight Row

Visual Otthymo Node 4

Slope = (163.93-163.29) / 69.55 = 0.92%

From Figure A.5.2 : Upland Method for Estimating Tc
(SCS National Engineering Handbook, 1971)

v = 0.28 m/s

t_c = 69.55 / 0.28 = 248.38 s = 0.069 h

t_p = 2 x t_c / 3 = 0.046 h

3) Open Space Flowing Directly into Creek

Upstream Invert 170.00
Downstream Invert 157.61
Length (m) 630.16
Assume Woodland/Contour

Visual Otthymo Node 11

Slope = (170.00 - 157.61) / 630.16 = 1.97%

From Figure A.5.2 : Upland Method for Estimating Tc
(SCS National Engineering Handbook, 1971)

v = 0.22 m/s

t_c = 630.16 / 0.22 = 2864.35 s = 0.796 h

t_p = 2 x t_c / 3 = 0.530 h

4) Block 46 Uncontrolled Drainage

Upstream Invert 165.00
Downstream Invert 162.27
Length (m) 157.43
Assume Cultivated Straight Row

Visual Otthymo Node 12

Slope = (165.00 - 162.27) / 157.43 = 1.73%

From Figure A.5.2 : Upland Method for Estimating Tc
(SCS National Engineering Handbook, 1971)

v = 0.37 m/s

t_c = 157.43 / 0.37 = 424.81 s = 0.118 h

t_p = 2 x t_c / 3 = 0.079 h

Post-Development Weighted Runoff Coefficients 2025-01-28
Osaca Port Hope Subdivision 1/1
Job Number: 122049

Node 3 - Area Draining to Pond B (BLK 40)			Area =	1.10 ha
Material	**Area (ha)**	**RC (I)**	**A*I**	
Asphalt	0.237	0.9	0.213074	
Gravel Shoulder	0.059	0.6	0.035594	
Landscape	0.442	0.2	0.088346	
SWM Pond	0.365	0.5	0.182707	
Total	1.10		0.519722	
Weighted RC =	0.4711			
% IMP =	38.7286%			

Node 9 - Draining to Low Point at Street B (ST 1 +068) and Draining to BLK 39 (Pond A)			Area =	4.00 ha
Material	**Area**	**RC (I)**	**A*I**	
Road & Driveways	0.731	0.9	0.657592	
Gravel Shoulder	0.219	0.6	0.131431	
SWM BLK	0.423	0.5	0.211411	
Landscape	2.623	0.2	0.524693	
Total	4.00		1.525127	
Weighted RC =	0.3817			
*% IMP =	25.9571%			

Node 4 - Street A & Lots Draining to County Rd 65			Area =	1.90 ha
Material	**Area (ha)**	**RC (I)**	**A*I**	
Roads & Driveways	0.024	0.9	0.021276	
Gravel Shoulder	0.011	0.6	0.006551	
Landscape	1.868	0.2	0.373605	
Total	1.90		0.401433	
Weighted RC =	0.2110			
% IMP =	1.5714% *			
* Since % Imperviousness < 5%, model as a NasHyd				

Osaca - Stormwater Management Pond A (BLK 39)
Our File: 122049
2025-01-29

DRY POND QUANTITY REQUIREMENTS (60% TSS Removal)
***Imp Levels taken from Table 3.2 of MECP SWM Planning & Design Manual**

IMPERVIOUS LEVEL	STORAGE VOLUME REQUIRED(m^3/ha)
85%	240
70%	200
55%	150
35%	90

Areas Draining to Pond A	Area (ha)	% Impervious	A x I
Node 13 - Western Phase 2 Draining to Pond	4.00	25.96%	1.53
TOTAL	4.00		1.53
Weighted RC =	0.38		
% IMP =	25.96%		

Since 25.96% is below the 35%, a conservative permanent storage volume of 90 m^3/ha is required .

Fluctuating Storage is the 25mm storm event:

Total Drainage Area (ha)	Total Rainfall (mm)	Runoff Depth (mm)	Volume Required (m^3)
4.00	25	9.44	377.10

DRY POND QUANTITY REQUIREMENTS (ANNUAL SEDIMENTATION LOADING)
***Annual Loading value taken from Table 6.3 of MECP SWM Planning & Design Manual**

Total Drainage Area (ha)	Annual loading (m3/ha/year)	Maintenance years	Volume Required (m^3)
4.00	0.6	20.00	47.95

Therefore, storage requirements are as follows:

Dry Pond Storage Vol. req'd (90 m3/ha) =	359.64 m^3
Fluctuating Storage Volume =	377.10 m^3
Sediments Annual Loading Volume =	47.95 m^3
100-Year storm required Volume =	795.00 m^3
Total Required Volume=	1579.69 m^3

Osaca - Stormwater Management Pond A (BLK 39)
Our File: 122049
2025-01-28

Pond Storage

Quantity Controls
Invert 162.700 m

Orifice 1
$Q = CA(2gh)^{0.5}$
Diameter = 100 mm
Area = 0.007854 m^2
C = 0.61 (PLATE)
C/L ELEV = 162.75
INV ELEV= 162.70

Weir 1
$Q = \frac{2}{3} C_W B \sqrt{2g} (h)^{3/2}$
C_w= 0.577 m
B (width)= 1.80 m
INV ELEV= 163.00

ELEV	AREA	AVERAGE AREA	DEPTH	VOLUME	TOTAL VOLUME	ORIFICE 1		WEIR		TOTAL FLOW
						HEAD	FLOW	HEAD	FLOW	
m	m2	m2	m	m3	m3	m	cms	m	cms	cms
162.670	1144.700				0.000	0.00	0.00000	0.00	0.00000	0.000
		1245.990	0.200	249.198						
162.870	1347.280				249.198	0.12	0.00735	0.00	0.00000	0.007
		1455.845	0.200	291.169						
163.070	1564.410				540.367	0.32	0.01200	0.07	0.05680	0.069
		1679.570	0.200	335.914						
163.270	1794.730				876.281	0.52	0.01530	0.27	0.43028	0.446
		1916.135	0.200	383.227						
163.470	2037.540				1259.508	0.72	0.01801	0.47	0.98822	1.006
		2165.490	0.200	433.098						
163.670	2293.440				1692.606	0.92	0.02035	0.67	1.68197	1.702

Orifice Sizing Calculations
From MOE Stormwater Management Practices Manual

$$t = \frac{2xA_p}{CxA_o(2g)^{0.5}} \times (h_1^{0.5}-h_2^{0.5})$$

$$86400 = \frac{2x2293.44}{0.61xA_o(2x9.81)^{0.5}} \times (0.660^{.5}-0.00^{0.5})$$

$$A_o = \frac{1918.83}{86400 \times 2.702}$$

A_o= 0.0082 m^2

t=Drawdown Time(s)	86400	s
A_p= Pond Area(@ Max WSE)=	2293.44	m^2
C= Discharge Coefficient=	0.61	
h_1=Max. head(m)		
=	0.18	m
h_2=Min. head(m)		
=	0.00	m
C/L Orifice=	162.75	m
g=Gravity=	9.81	m/s^2
A_o= Orifice Area	0.00785	m^2

Orifice Diameter

$$Dia = \frac{4xA_o}{PI}$$

Dia= 0.100 m

Check Drawdown time (Equation 4.10 - MOE 2003 Manual)

$$t = \frac{2\,A_p}{CA_o(2g)^{0.5}} (h_1^{0.5} - h_2^{0.5})$$

= 90421 s

= 25.12 h

D= Orifice Diameter	0.100	m
A_o= Orifice Area	0.00785	m^2
g=Gravity=	9.81	m/s^2
A_p = Surface Area of Pond (m^2) =	2293.44	m^2
h_1 = Starting Water Elevation = Above the Orifice	0.00	m
h_2 = Ending Water Elevation = Above the Orifice	0.18	
C= Discharge Coefficient=	0.61	

Orifice 1 Discharge

Orifice Diameter:	100	mm
Orifice Type:	PLATE	
Orifice Coeff	0.61	
Orifice Inv	162.70	m
Centreline:	162.75	m
X-Sectional Area:	0.007854	m2
Gravity Constant	9.81	m/s2

Elevation (m)	Head (m)	Discharge (m3/s)	Discharge (L/s)
162.70	0.00	0.00000	0.00
162.90	0.15	0.00822	8.22
163.10	0.35	0.01255	12.55
163.30	0.55	0.01574	15.74
163.50	0.75	0.01838	18.38
163.70	0.95	0.02068	20.68

Orifice Discharge Equation

Q= 0.021221165 Sqrt(H)

Note: Orifice Coefficient for PLATE orfice = 0.61
Orifice Coefficient for TUBE orfice = 0.80

Orifice Equation based on:
$Q=CA\sqrt{2GH}$

G = Gravitational Constant
H = Head (m)
A = X-Sectional Area (m2)
C = Orifice Coefficient

PROJECT Osaca Subdivision - Pond A (BLK 39)
PROJECT # 122049
DATE Jan-25

POND VOLUMES AND DISCHARGE - BLOCKED CONDITIONS

Weir 1 - See diagram on following page

Section 1 (rectangular portion)

$$Q = \frac{2}{3} C_W B \sqrt{2g} (h)^{3/2})$$

C_w= 0.577
B (width)= 1.00 m
Weir 1 163.67 m

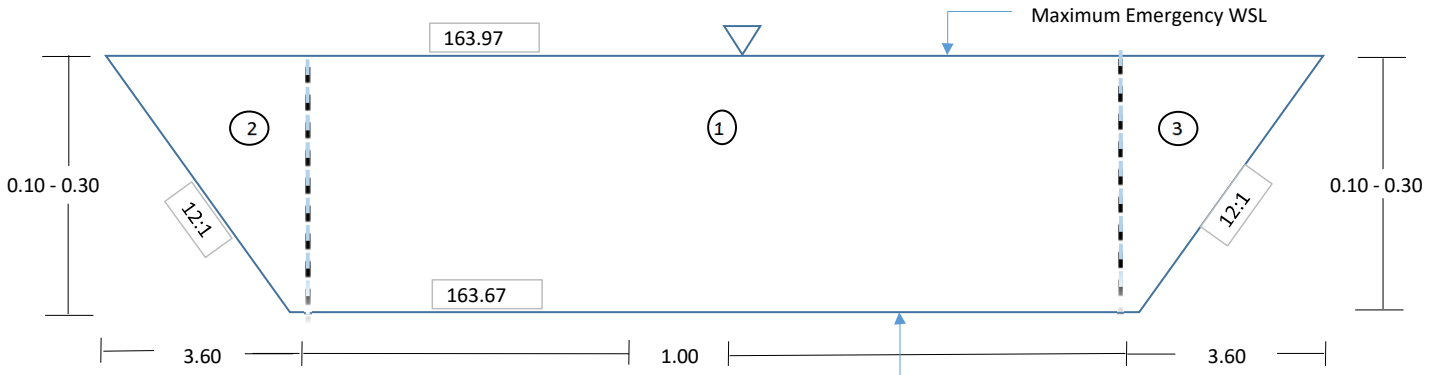
Section 2 & 3 (triangular portion)

$$Q = \frac{2}{3} C_W B \sqrt{2g} ((\frac{2}{3} h)^{3/2})$$

C_w= 0.577
B (width)= d / (1/5) m

	ELEV	AREA	AVERAGE AREA	DEPTH	VOLUME	TOTAL VOLUME	ORIFCE 1		ORIFICE 2		WEIR		TOTAL FLOW
							HEAD	FLOW	HEAD	FLOW	HEAD	FLOW	
	m	m2	m2	m	m3	m3	m	cms	m	cms	m	cms	cms
Emergency	163.67	2293.44				0.00					0.00	0.000	0.0000
Flow			2416.52	0.10	241.65								
	163.77	2539.60				241.65					0.10	0.083	0.0832
			2571.47	0.10	257.15								
	163.87	2603.33				498.80					0.20	0.318	0.3183
			2635.48	0.10	263.55								
	163.97	2667.64				762.35					0.30	0.737	0.7372

Weir Diagram



HYMO $Q_{100\ YEAR}$ = 0.582 m^3/s Visual Otthymo - Node 3

Therefore, in the event of blocked conditions, the emergency overflow weir has the capacity to convey the 100 Year Flows.

Osaca - Stormwater Management Pond B (BLK 40)
Our File: 122049
2025-01-28

DRY POND QUANTITY REQUIREMENTS (60% TSS Removal)
***Imp Levels taken from Table 3.2 of MECP SWM Planning & Design Manual**

IMPERVIOUS LEVEL	STORAGE VOLUME REQUIRED(m^3/ha)
85%	240
70%	200
55%	150
35%	90

Areas Draining to Pond B	Area (ha)	% Impervious	A x I
Node 06- Eastern Phase 2 Draining to Pond	1.10	38.73%	0.52
TOTAL	1.10		0.52
Weighted RC =	0.47		
% IMP =	38.73%		

Since 38.73% is between the 35% & 55% ranges, a value for permanent storage volume was interpolated of 101.19 m^3/ha.

Fluctuating Storage is the 25mm storm event:

Total Drainage Area (ha)	Total Rainfall (mm)	Runoff Depth (mm)	Volume Required (m^3)
1.10	25	11.94	131.71

DRY POND QUANTITY REQUIREMENTS (ANNUAL SEDIMENTATION LOADING)
***Annual Loading value taken from Table 6.3 of MECP SWM Planning & Design Manual**

Total Drainage Area (ha)	Annual loading (m3/ha/year)	Maintenance years	Volume Required (m^3)
1.10	0.84	20.00	18.59

Therefore, storage requirements are as follows:

Dry Pond Storage Vol. req'd (101.19 m3/ha) =	111.63 m^3
Fluctuating Storage Volume =	131.71 m^3
Sediments Annual Loading Volume =	18.59 m^3
100-Year storm required Volume =	484.00 m^3
Total Required Volume=	745.94 m^3

Orifice 1
$Q = CA(2gh)^{0.5}$
Diameter = 0.090m
Area = 0.00636m
C = 0.61 (PLATE)
C/L ELEV = 162.05m

Pond Storage

Quantity Controls
Invert 162.000 m

ELEV	AREA	AVERAGE AREA	DEPTH	VOLUME	TOTAL VOLUME	ORIFICE 1		ORIFICE 2		TOTAL FLOW
						HEAD	FLOW	HEAD	FLOW	
m	m2	m2	m	m3	m3	m	cms	m	cms	cms
162.000	541.956				0.000	0.00	0.000000			0.000000
		623.234	0.200	124.647						
162.200	704.512				124.647	0.16	0.006767			0.006767
		792.385	0.200	158.477						
162.400	880.258				283.124	0.35	0.010242			0.010242
		975.265	0.200	195.053						
162.600	1070.273				478.177	0.55	0.012806			0.012806
		1171.935	0.200	234.387						
162.800	1273.596				712.564	0.75	0.014936			0.014936
		1389.933	0.200	277.987						
163.000	1506.269				990.550	0.95	0.016798			0.016798

Orifice Sizing Calculations
From MOE Stormwater Management Practices Manual

$$t = \frac{2xA_p}{CxA_o(2g)^{0.5}} \times (h_1^{0.5}-h_2^{0.5})$$

$$86400 = \frac{2x1273.60}{0.61xA_o(2x9.81)^{0.5}} \times (0.25^{0.5}-0.00^{0.5})$$

$$A_o = \frac{2449.81}{86400 \times 2.702}$$

A_o= 0.0105 m^2

t=Drawdown Time(s)	86400	s
A_p= Pond Area(@ Max WSE)=	1273.60	m^2
C= Discharge Coefficient=	0.61	
h_1=Max. head(m)		
= 163.00 - 162.075	0.93	m
h_2=Min. head(m)		
= 162.60 - 162.60	0.00	m
C/L Orifice=	162.05	m
g=Gravity=	9.81	m/s^2
A_o= Orifice Area	0.00636	m^2

Orifice Diameter

$$Dia = \frac{4xA_o}{PI}$$

Dia= 0.090 m

Check Drawdown time (Equation 4.10 - MOE 2003 Manual)

$$t = \frac{2\,A_p}{CA_o(2g)^{0.5}} (h_1^{0.5} - h_2^{0.5})$$

= 142521 s

= 39.59 h

D= Orifice Diameter	0.090	m
A_o= Orifice Area	0.00636	m^2
g=Gravity=	9.81	m/s^2
A_p = Surface Area of Pond (m^2) =	1273.60	m^2
h_1 = Starting Water Elevation = Above the Orifice	0.00	m
h_2 = Ending Water Elevation = Above the Orifice	0.93	
C= Discharge Coefficient=	0.61	

Orifice 1 Discharge

Orifice Diameter:	90	mm
Orifice Type:	PLATE	
Orifice Coeff	0.61	
Orifice Inv	162.00	m
Centreline:	162.05	m
X-Sectional Area:	0.006362	m2
Gravity Constant	9.81	m/s2

Elevation (m)	Head (m)	Discharge (m3/s)	Discharge (L/s)
162.00	0.00	0.00000	0.00
162.20	0.16	0.00677	6.77
162.40	0.35	0.01024	10.24
162.60	0.55	0.01281	12.81
162.80	0.75	0.01494	14.94
163.00	0.95	0.01680	16.80

Orifice Discharge Equation

Q= 0.017189 Sqrt(H)

Note: Orifice Coefficient for PLATE orfice = 0.61
Orifice Coefficient for TUBE orfice = 0.80

Orifice Equation based on:
Q=CAV2GH

G = Gravitational Constant
H = Head (m)
A = X-Sectional Area (m2)
C = Orifice Coefficient

PROJECT Osaca Subdivision - Pond B (BLK 40)
PROJECT # 122049
DATE Jan-25

POND VOLUMES AND DISCHARGE - BLOCKED CONDITIONS

Weir 1 - See diagram on following page

Section 1 (rectangular portion)

$$Q = \frac{2}{3} C_w B \sqrt{2g} (h)^{3/2})$$

C_w= 0.577
B (width)= 1.00 m
Weir 1 163 m

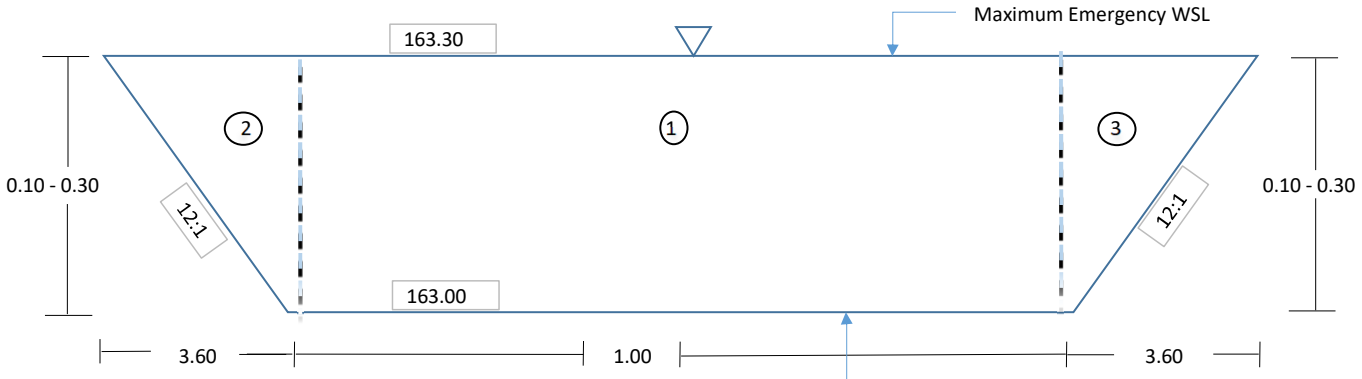
Section 2 & 3 (triangular portion)

$$Q = \frac{2}{3} C_w B \sqrt{2g} ((\frac{2}{3} h)^{3/2})$$

C_w= 0.577
B (width)= d / (1/5) m

	ELEV	AREA	AVERAGE AREA	DEPTH	VOLUME	TOTAL VOLUME	ORIFCE 1 HEAD	ORIFCE 1 FLOW	ORIFICE 2 HEAD	ORIFICE 2 FLOW	WEIR HEAD	WEIR FLOW	TOTAL FLOW
	m	m2	m2	m	m3	m3	m	cms	m	cms	m	cms	cms
Emergency	163.00	1506.27				0.00					0.00	0.000	0.0000
Flow			1536.59	0.10	153.66								
	163.10	1566.91				153.66					0.10	0.083	0.0832
			1597.51	0.10	159.75								
	163.20	1628.11				313.41					0.20	0.318	0.3183
			1659.00	0.10	165.90								
	163.30	1689.89				479.31					0.30	0.737	0.7372

Weir Diagram



HYMO $Q_{100\ YEAR}$ = 0.214 m^3/s Visual Otthymo - Node 3

Therefore, in the event of blocked conditions, the emergency overflow weir has the capacity to convey the 100 Year Flows.

Job **5868 County Road 65 Subdivision** 2025-01-28
Job # **122049** 1/1
Culvert Design Crossing Under Street A Entrance

Area Draining to Culvert (Node 19)			
Material	**Area**	**RC**	**A x I**
Road	0.144	0.9	0.1299
Shoulder	0.014	0.6	0.0082
Landscape	2.056	0.2	0.4111
TOTAL	2.213627		0.5493
	Weighted RC		0.2481
	% IMP =	6.8714%	

Inlet	162.26		
Outlet	162.20		
Q=	0.258	m^3/s	Refer to VH Output in Appendix
D =	0.375		
N =	2.00		
H_f/D =	1.30		
H =	0.49	m	

CULVERT DATA					**Inlet Control**	
DESCRIP.	**DIA.**	**NO.**	**Q/N**	**AREA**	**HW/D**	**HW**
	(m)	**N**	**(m^3/s)**	**(m^2)**		**(m)**
7	**8**	**9**	**10**	**11**	**13**	**14**
375mm	0.375	2.00	0.13	0.11	1.30	0.49

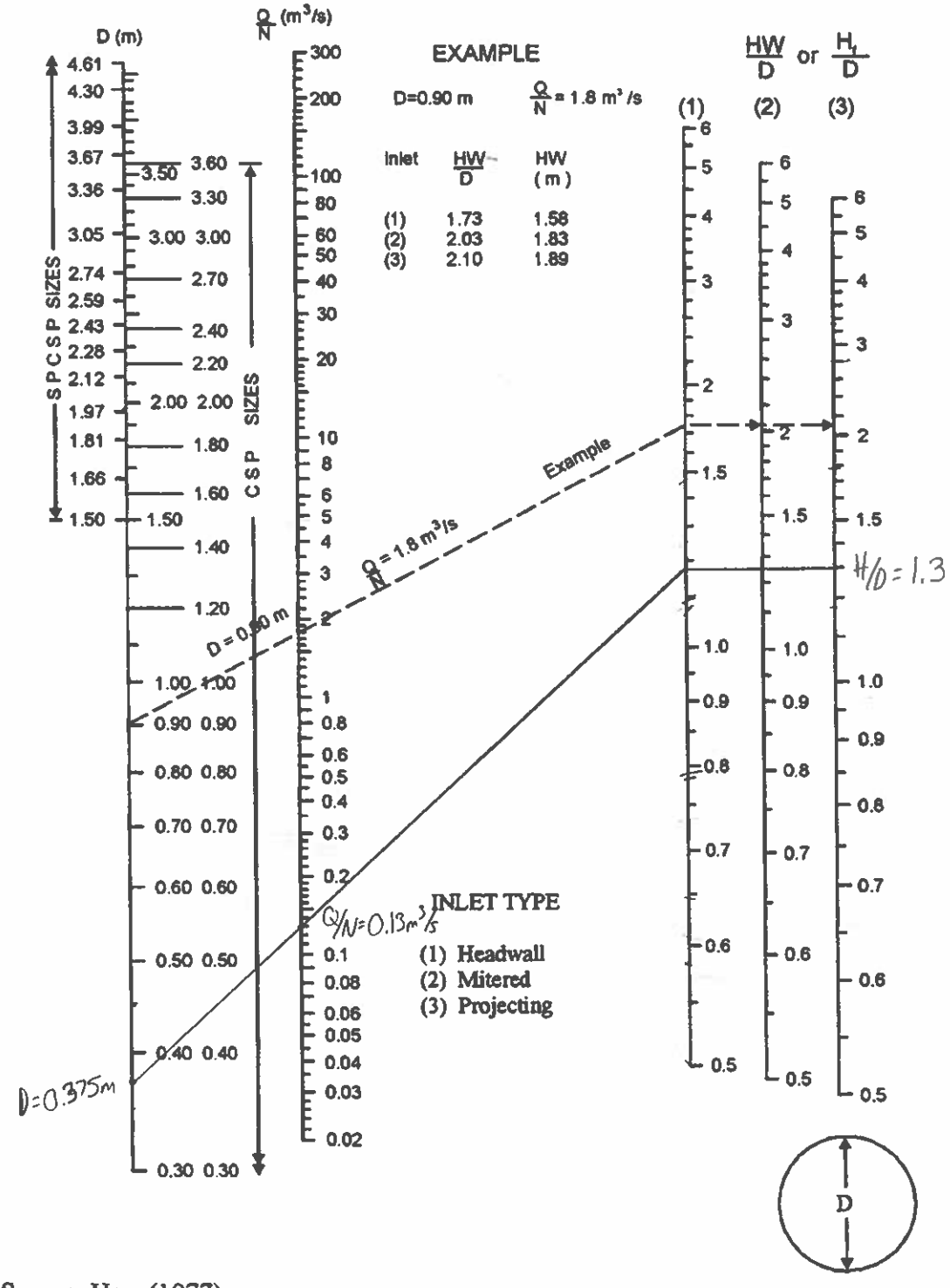
9 NUMBER OF BARRELS
10 COL. 1 / COL. 9
11 AREA PER BARREL
12 BOX CULVERT ONLY
13 DESIGN CHART 2.32
14 COL. 8 x COL. 13

Shoulder Elevation North side of Street A Intersection = 163.00
Max WSE @ Inlet = **162.75** < 163.00

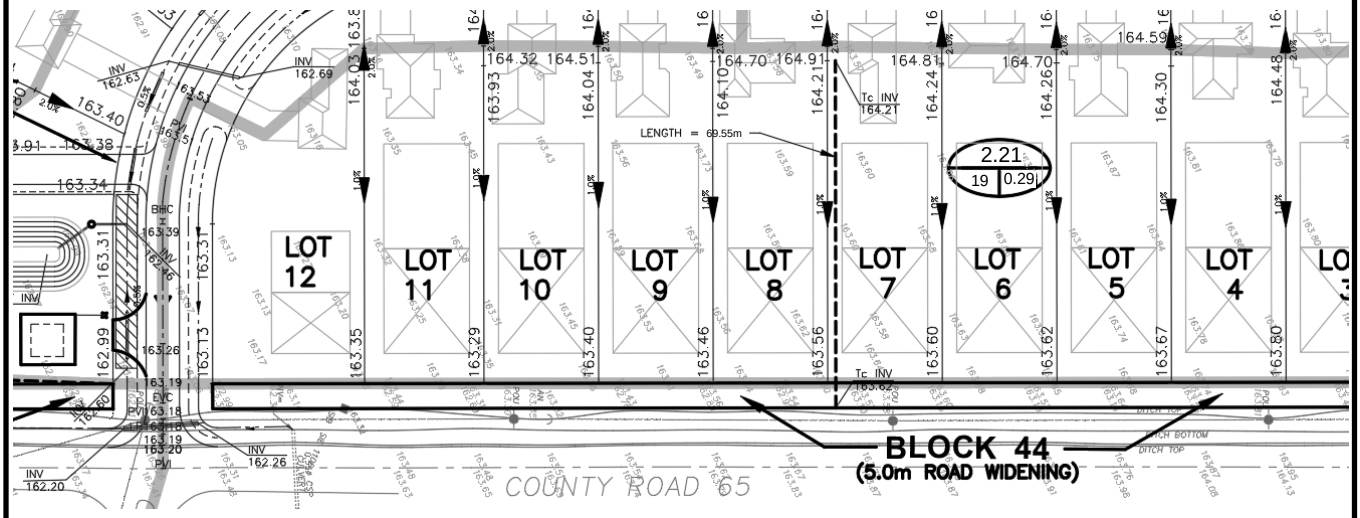
Since water surface elevation at inlet is less than the height of the shoulder, water will not overtop Street A.

Culvert Under Street A Entrance

Design Chart 2.32: Inlet Control: Circular CSP and SPCSP Culverts



Source: Herr (1977)



CULVERT UNDER ST A ENTRANCE

D.G. BIDDLE & ASSOCIATES
CONSULTING ENGINEERS & PLANNERS

96 King Street East
Oshawa, Ontario, L1H 1B6

Phone: 905-576-8500

info@dgbiddle.com
dgbiddle.com

FIG 2

DRAWN BY:	CHECKED BY:	DRAWING NO.
C.P.J.	M.J.H.	122049
DATE: JAN 2025	SCALE: NTS	

Job **5868 County Road 65 Subdivision** 2025-01-28

Job # **122049** 1/1

Culvert Design Crossing Under Street B At Street A & B Intersection

Area Draining to Culvert (Node 20)			
Material	**Area**	**RC**	**A x I**
Road	0.026	0.90	0.0235
Shoulder	0.008	0.60	0.0051
Landscape	0.051	0.20	0.0101
TOTAL	0.085272		0.0388

Weighted RC 0.4545

% IMP = 36.3571%

Inlet 163.80

Outlet 163.73

Q= 0.018 m^3/s Refer to VH Output in Schedule 2

D = 0.300

N = 1.00

H_f/D = 0.50

H = 0.15 m

CULVERT DATA					Inlet Control		
DESCRIP.	**DIA.**	**NO.**	**Q/N**	**AREA**	**HW/D**	**HW**	
	(m)	**N**	**(m^3/s)**	**(m^2)**		**(m)**	
7	**8**	**9**	**10**	**11**	**13**	**14**	
375mm	0.300	1.00	0.018	0.07	0.50	0.15	

9 NUMBER OF BARRELS

10 COL. 1 / COL. 9

11 AREA PER BARREL

12 BOX CULVERT ONLY

13 DESIGN CHART 2.32

14 COL. 8 x COL. 13

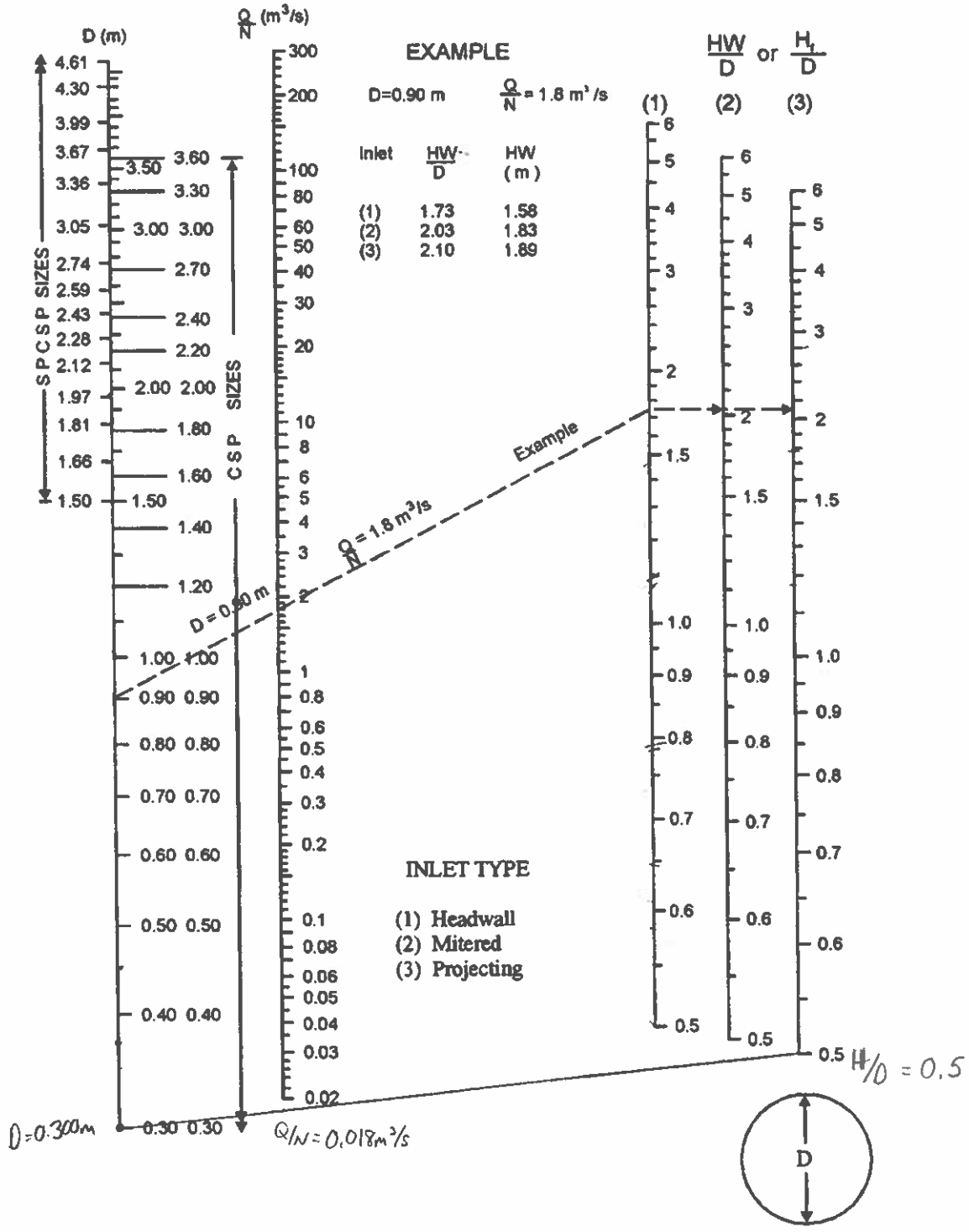
Shoulder Elevation North side of Street A Intersection = 164.49

Max WSE @ Inlet = **163.95** < 164.49

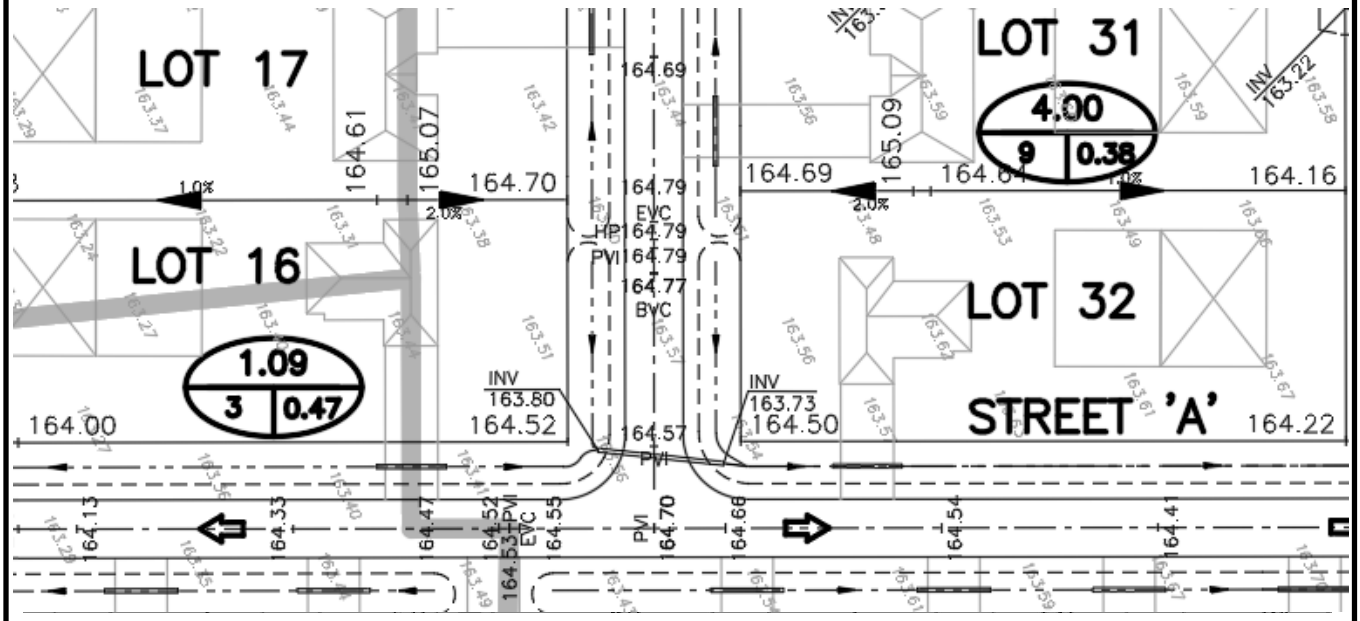
Since water surface elevation at inlet is less than the height of the shoulder, water will not overtop Street B.

Culvert Under Street B Entrance

Design Chart 2.32: Inlet Control: Circular CSP and SPCSP Culverts



Source: Herr (1977)



CULVERT UNDER ST B ENTRANCE

D.G. BIDDLE & ASSOCIATES
CONSULTING ENGINEERS & PLANNERS

96 King Street East
Oshawa, Ontario, L1H 1B6

Phone: 905-576-8500

info@dgbiddle.com
dgbiddle.com

FIG 3

DRAWN BY:	CHECKED BY:	DRAWING NO.
C.P.J.	M.J.H.	122049
DATE: JAN 2025	SCALE: NTS	

Job **5868 County Road 65 Subdivision** 2025-01-28
Job # **122049** 1/1
Culvert Design Crossing Under Street A From OLF Channel

Area Draining to Culvert (Node 21)			
Material	**Area**	**RC**	**A x I**
Road	0.452	0.90	0.407
Shoulder	0.180	0.60	0.108
Landscape	1.961	0.20	0.392
TOTAL	2.593069		0.907

Weighted RC 0.3499
% IMP = 21.4143%

Inlet 162.92
Outlet 162.84
Q= 0.343 m^3/s Refer to VH Output in Schedule 2
D = 0.375
N = 2.00
H_f/D = 3.00
H = 1.13 m

CULVERT DATA					Inlet Control	
DESCRIP.	**DIA.**	**NO.**	**Q/N**	**AREA**	**HW/D**	**HW**
	(m)	**N**	**(m^3/s)**	**(m^2)**		**(m)**
7	**8**	**9**	**10**	**11**	**13**	**14**
375mm	0.375	2.00	0.17	0.11	1.75	0.66

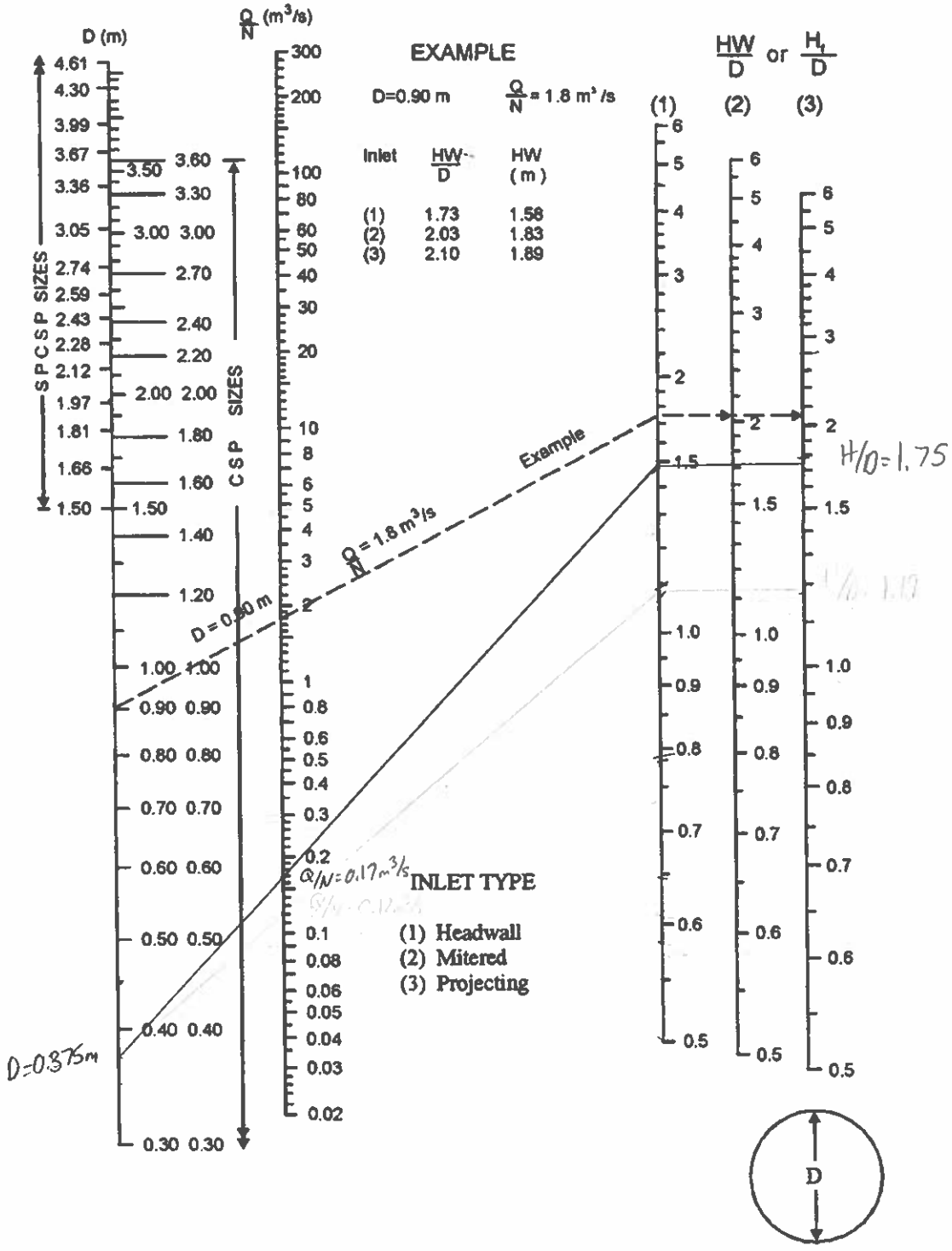
9 NUMBER OF BARRELS
10 COL. 1 / COL. 9
11 AREA PER BARREL
12 BOX CULVERT ONLY
13 DESIGN CHART 2.32
14 COL. 8 x COL. 13

Shoulder Elevation North side of Street A Intersection = 163.74
Max WSE @ Inlet = **163.58** < 163.74

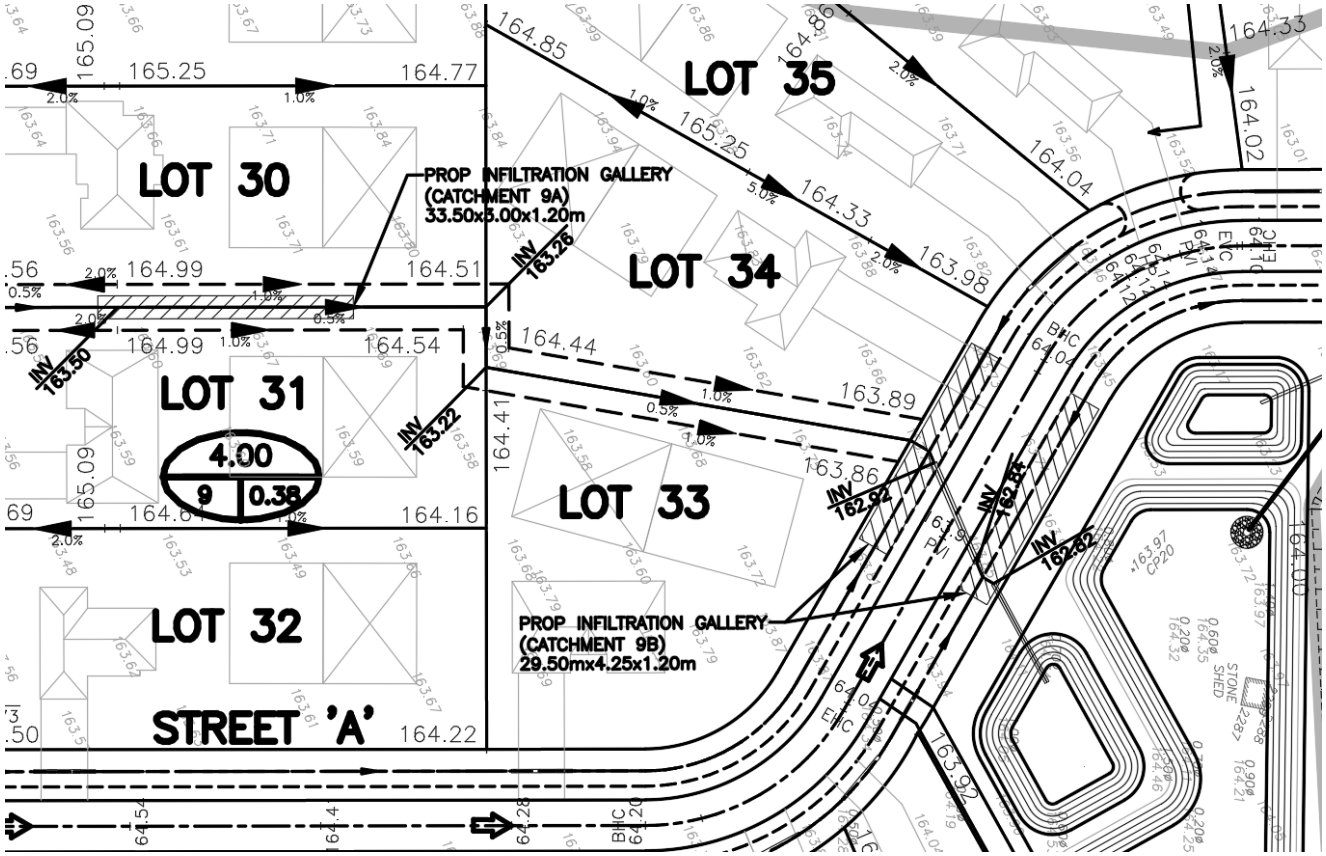
Since water surface elevation at inlet is less than the height of the shoulder, water will not overtop Street A.

Culvert Under Street A from OLF Channel

Design Chart 2.32: Inlet Control: Circular CSP and SPCSP Culverts



Source: Herr (1977)



CULVERT UNDER ST A FROM OLF

D.G. BIDDLE & ASSOCIATES
CONSULTING ENGINEERS & PLANNERS

96 King Street East
Oshawa, Ontario, L1H 1B6

Phone: 905-576-8500

info@dgbiddle.com
dgbiddle.com

FIG 4

DRAWN BY:	C.P.J.	CHECKED BY:	M.J.H.	DRAWING NO.	122049
DATE:	JAN 2025	SCALE:	NTS		

Job **5868 County Road 65 Subdivision** 2025-01-28
Job # **122049** 1/1
Culvert Design Conveying OLF into Pond BLK 39

Area Draining to Culvert (Node 22)			
Material	**Area**	**RC**	**A x I**
Road	0.613	0.90	0.552
Shoulder	0.214	0.60	0.128
Landscape	2.301	0.20	0.460
TOTAL	3.128176		1.141

Weighted RC 0.3646
% IMP = 23.5143%

Inlet 162.82
Outlet 162.67
Q= 0.432 m^3/s Refer to VH Output in Schedule 2
D = 0.525
N = 2.00
H_f/D = 0.98
H = 0.51 m

CULVERT DATA					**Inlet Control**	
DESCRIP.	**DIA.**	**NO.**	**Q/N**	**AREA**	**HW/D**	**HW**
	(m)	**N**	**(m^3/s)**	**(m^2)**		**(m)**
7	**8**	**9**	**10**	**11**	**13**	**14**
525mm	0.525	2.00	0.22	0.22	0.98	0.51

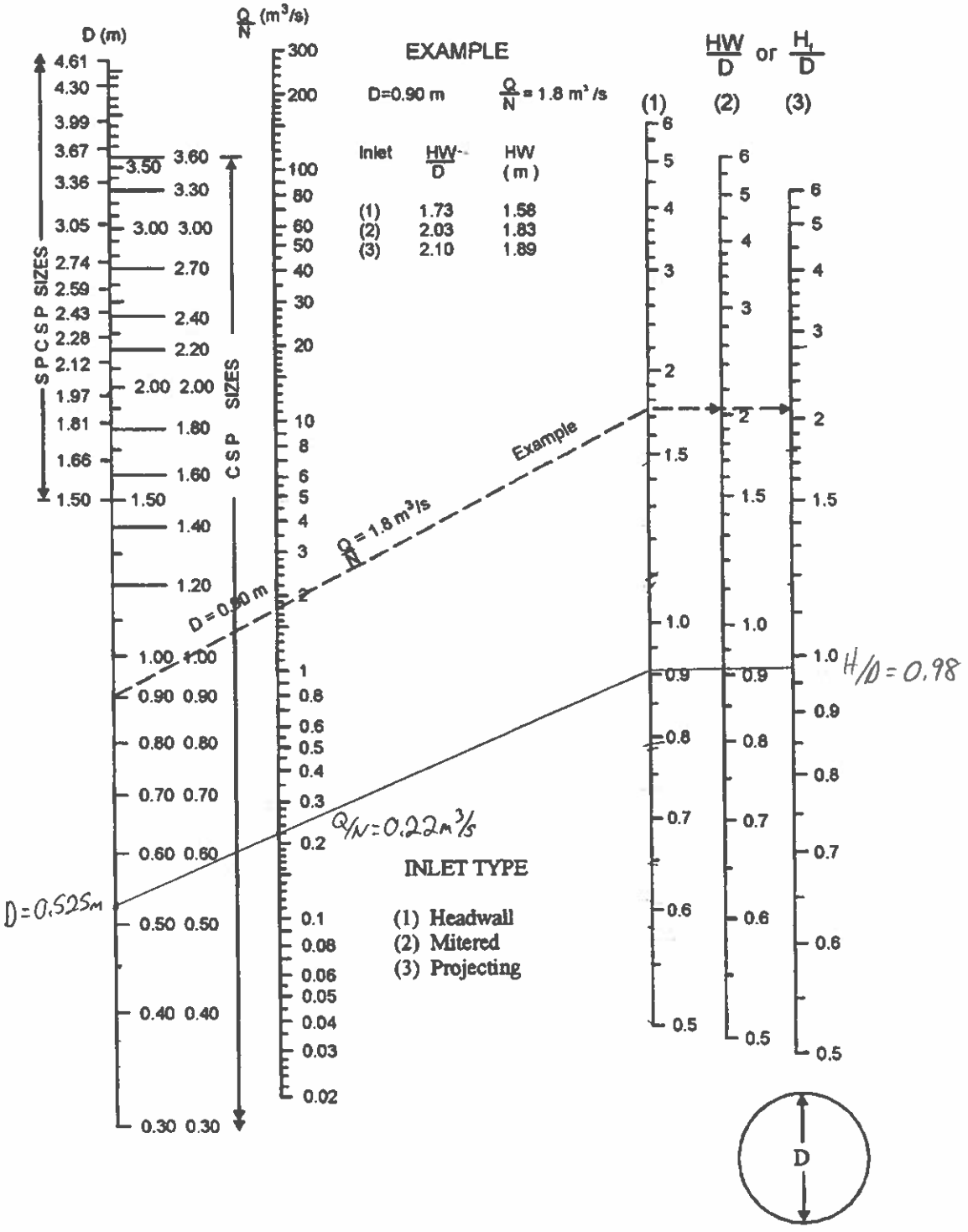
9 NUMBER OF BARRELS
10 COL. 1 / COL. 9
11 AREA PER BARREL
12 BOX CULVERT ONLY
13 DESIGN CHART 2.32
14 COL. 8 x COL. 13

Shoulder Elevation North side of Street A Intersection = 163.74
Max WSE @ Inlet = **163.33** < 163.74

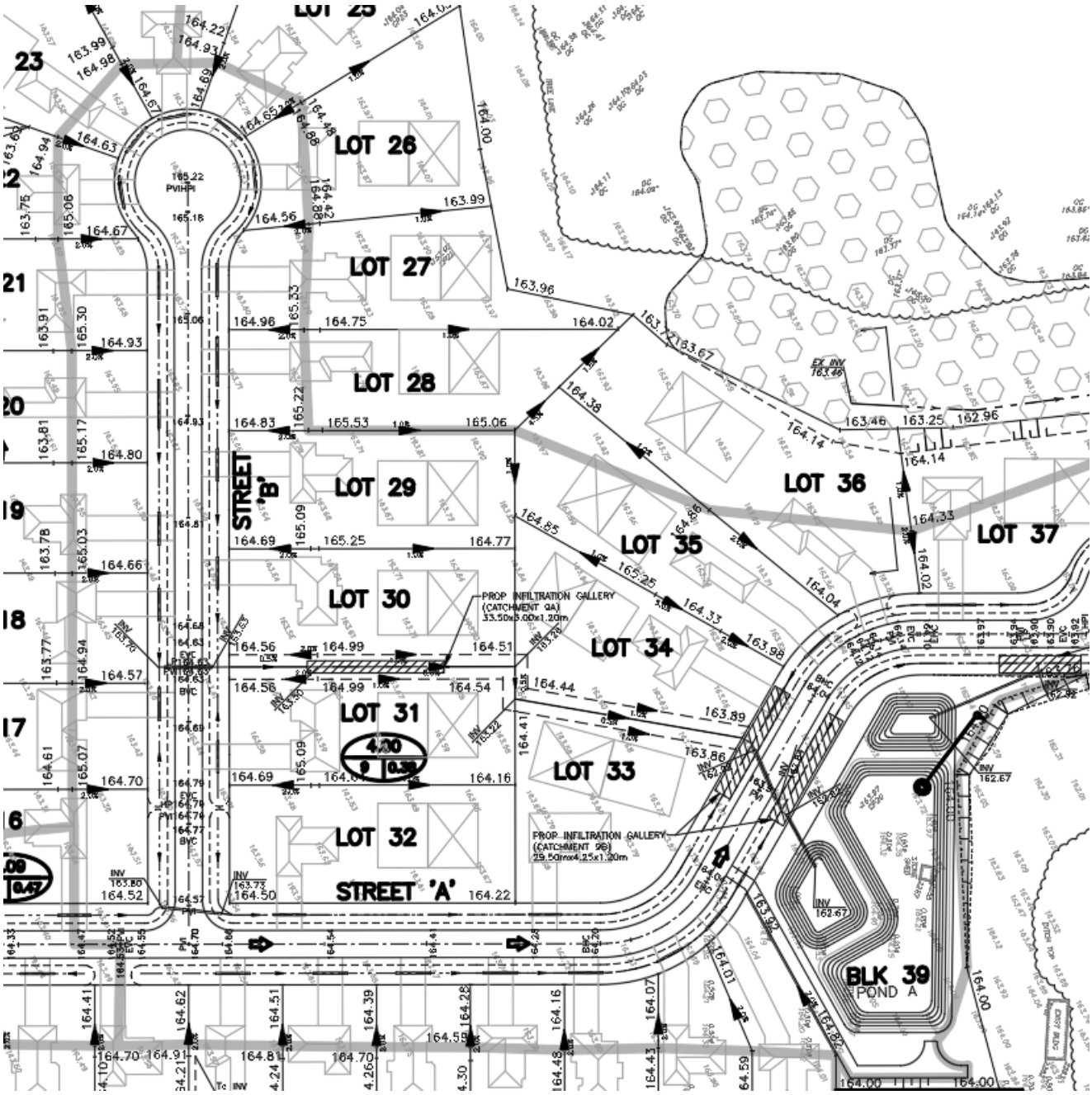
Since water surface elevation at inlet is less than the height of the shoulder, water will not overtop Street A.

Culvert Conveying OLF into Pond Block 39

Design Chart 2.32: Inlet Control: Circular CSP and SPCSP Culverts



Source: Herr (1977)



CULVERT FOR OLF INTO POND BLK39

D.G. BIDDLE & ASSOCIATES
CONSULTING ENGINEERS & PLANNERS

96 King Street East
Oshawa, Ontario, L1H 1B6

Phone: 905-576-8500

info@dgbiddle.com
dgbiddle.com

FIG 5

DRAWN BY: C.P.J.	CHECKED BY: M.J.H.	DRAWING NO. 122049
DATE: JAN 2025	SCALE: NTS	

Job **5868 County Road 65 Subdivision** 2025-01-28
Job # **122049** 1/1
Culvert Design Conveying OLF from Cul-de-sac into Pond BLK 39

Area Draining to Culvert (Node 23)			
Material	**Area**	**RC**	**A x I**
Road	0.1236	0.90	0.111
Shoulder	0.0294	0.60	0.018
Landscape	0.3447	0.20	0.069
TOTAL	0.497717		0.198

Weighted RC 0.3974
% IMP = 28.2000%

Inlet 162.82
Outlet 162.67
Q= 0.079 m^3/s Refer to VH Output in Schedule 2
D = 0.375
N = 1.00
H_f/D = 0.87
H = 0.33 m

CULVERT DATA					**Inlet Control**	
DESCRIP.	**DIA.**	**NO.**	**Q/N**	**AREA**	**HW/D**	**HW**
	(m)	**N**	**(m^3/s)**	**(m^2)**		**(m)**
7	**8**	**9**	**10**	**11**	**13**	**14**
375mm	0.375	1.00	0.08	0.11	0.87	0.33

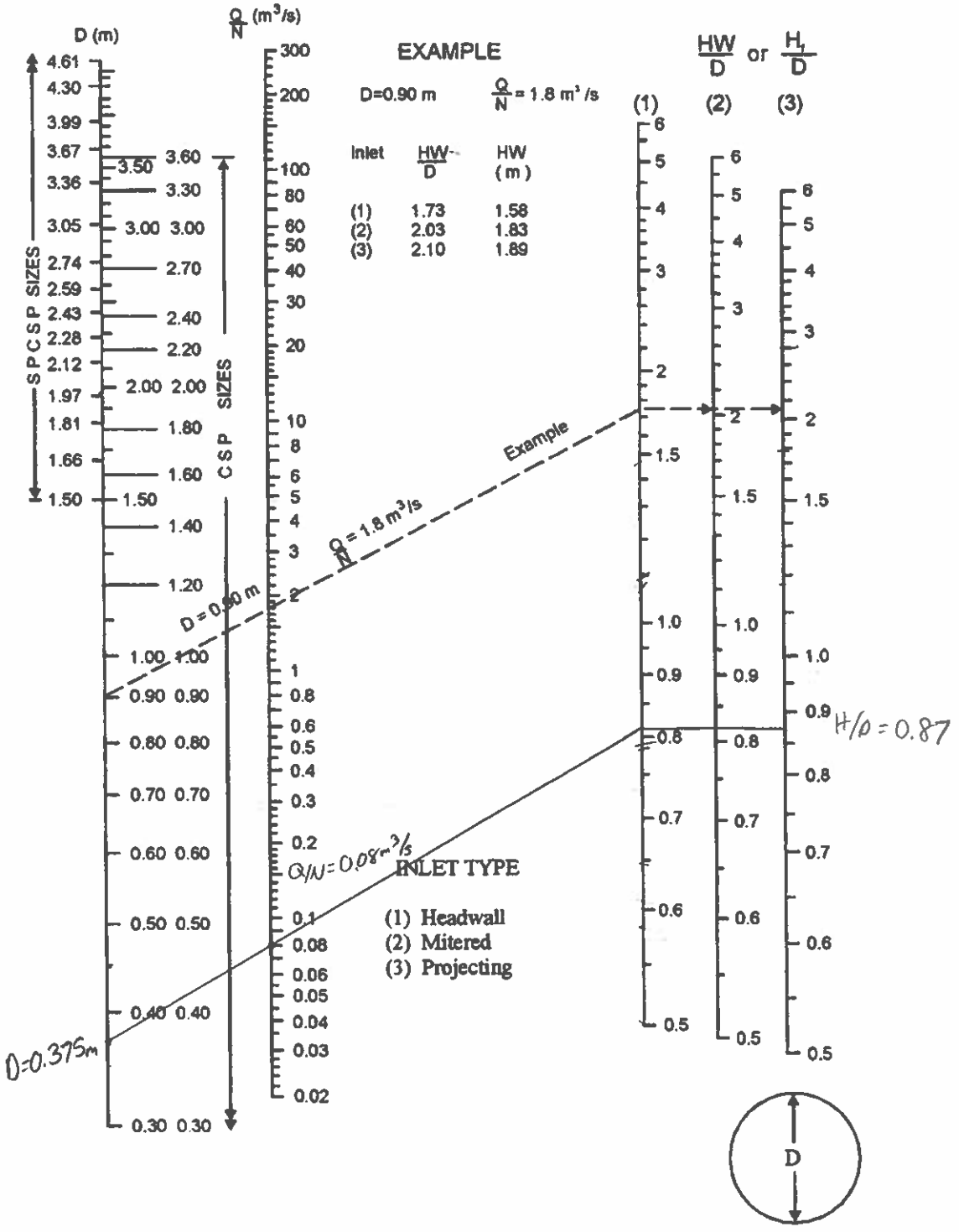
9 NUMBER OF BARRELS
10 COL. 1 / COL. 9
11 AREA PER BARREL
12 BOX CULVERT ONLY
13 DESIGN CHART 2.32
14 COL. 8 x COL. 13

Shoulder Elevation North side of Street A Intersection = 163.73
Max WSE @ Inlet = **163.15** < 163.73

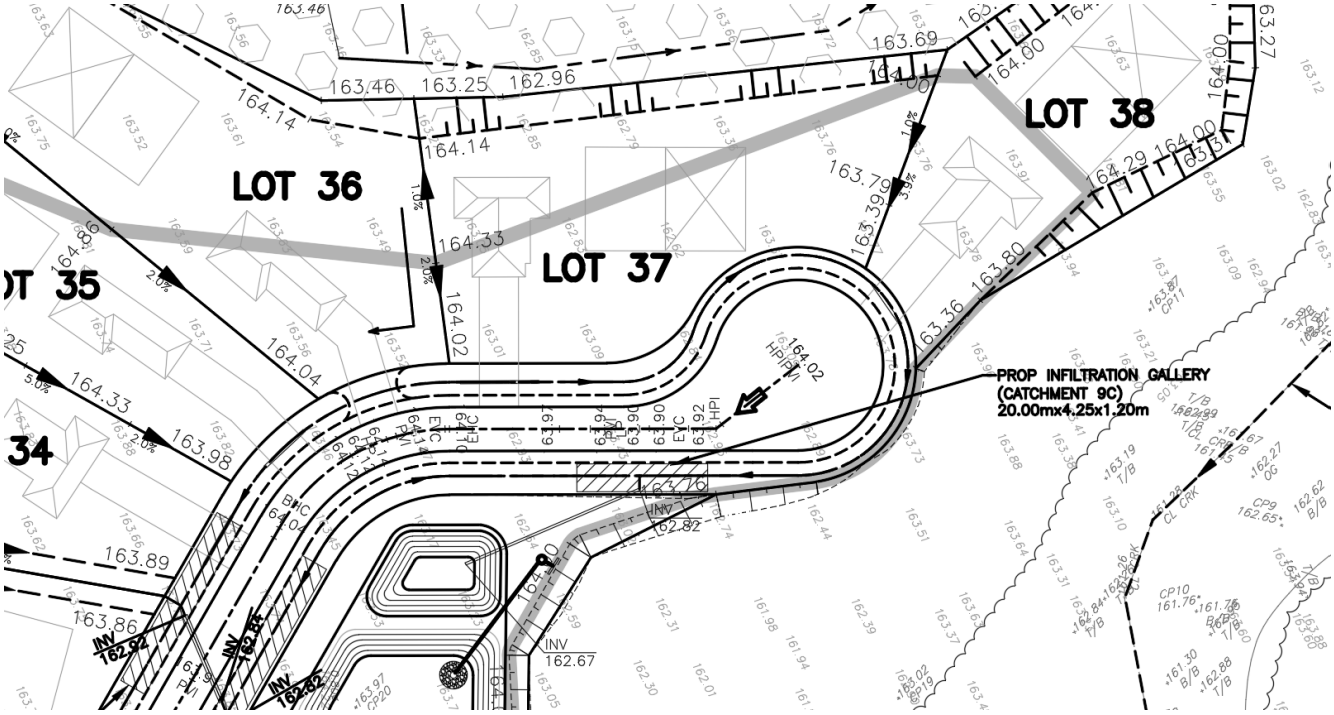
Since water surface elevation at inlet is less than the height of the shoulder, water will not overtop Street A.

Culvert Conveying OLF from Cul-De-Sac into Pond Block 39

Design Chart 2.32: Inlet Control: Circular CSP and SPCSP Culverts



Source: Herr (1977)



CULVERT FROM CUL-DE-SAC ST A

D.G. BIDDLE & ASSOCIATES
CONSULTING ENGINEERS & PLANNERS

96 King Street East
Oshawa, Ontario, L1H 1B6

Phone: 905-576-8500

info@dgbiddle.com
dgbiddle.com

FIG 6

DRAWN BY:	C.P.J.	CHECKED BY:	M.J.H.	DRAWING NO.	122049
DATE:	JAN 2025	SCALE:	NTS		

Job **5868 County Road 65 Subdivision** 2025-01-28
Job # **122049** 1/1
Culvert Design Conveying under Street B to OLF

Area Draining to Culvert (Node 24)			
Material	**Area**	**RC**	**A x I**
Road	0.167	0.90	0.150
Shoulder	0.024	0.60	0.014
Landscape	0.338	0.20	0.068
TOTAL	0.528452		0.232

Weighted RC 0.4386
% IMP = 34.0857%

Inlet 163.70
Outlet 163.63
Q= 0.094 m^3/s Refer to VH Output in Schedule 2
D = 0.300
N = 2.00
H_f/D = 0.90
H = 0.27 m

CULVERT DATA					**Inlet Control**	
DESCRIP.	**DIA.**	**NO.**	**Q/N**	**AREA**	**HW/D**	**HW**
	(m)	**N**	**(m^3/s)**	**(m^2)**		**(m)**
7	**8**	**9**	**10**	**11**	**13**	**14**
300mm	0.300	2.00	0.05	0.07	0.90	0.27

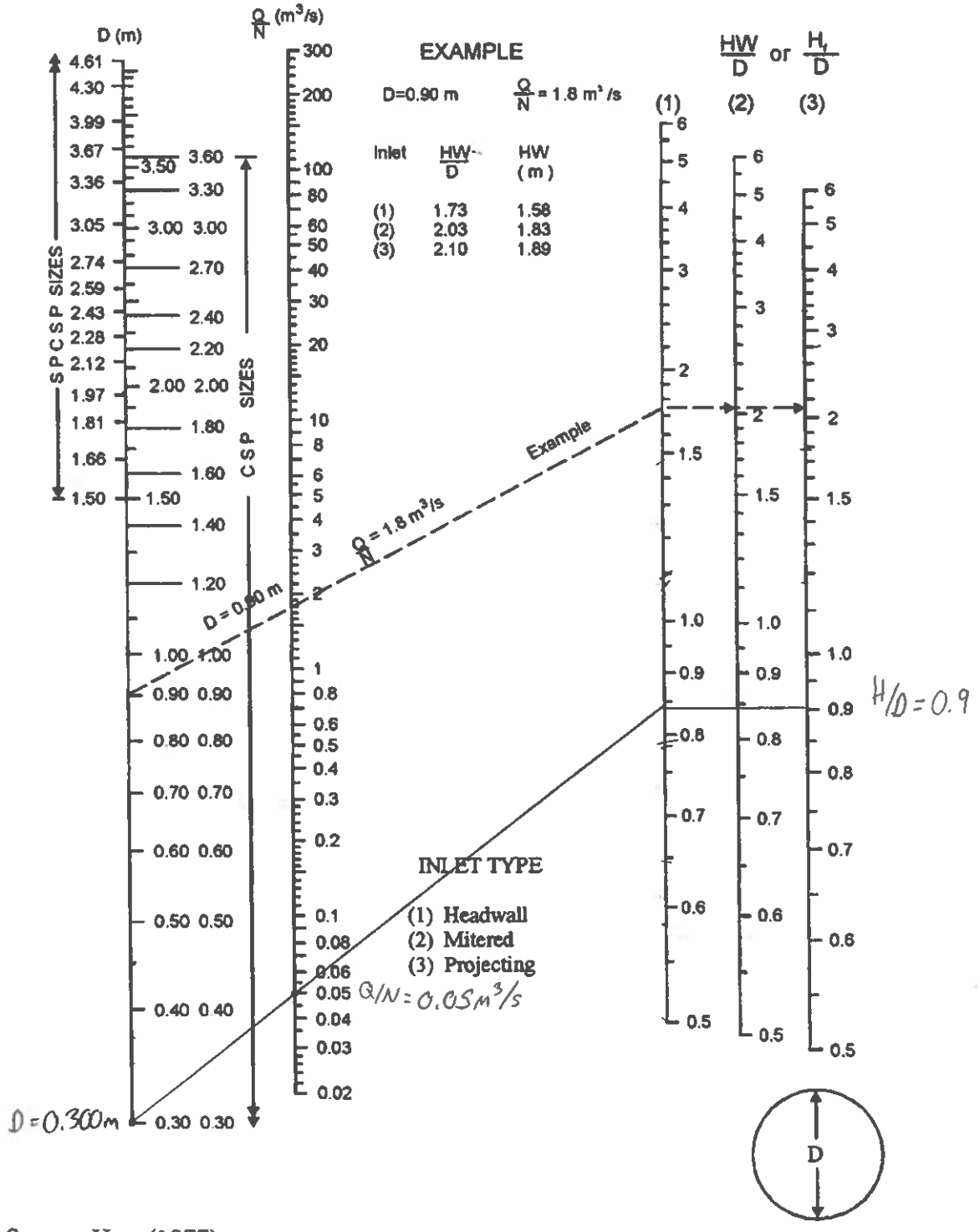
9 NUMBER OF BARRELS
10 COL. 1 / COL. 9
11 AREA PER BARREL
12 BOX CULVERT ONLY
13 DESIGN CHART 2.32
14 COL. 8 x COL. 13

Shoulder Elevation North side of Street A Intersection = 164.46
Max WSE @ Inlet = **163.97** < 164.46

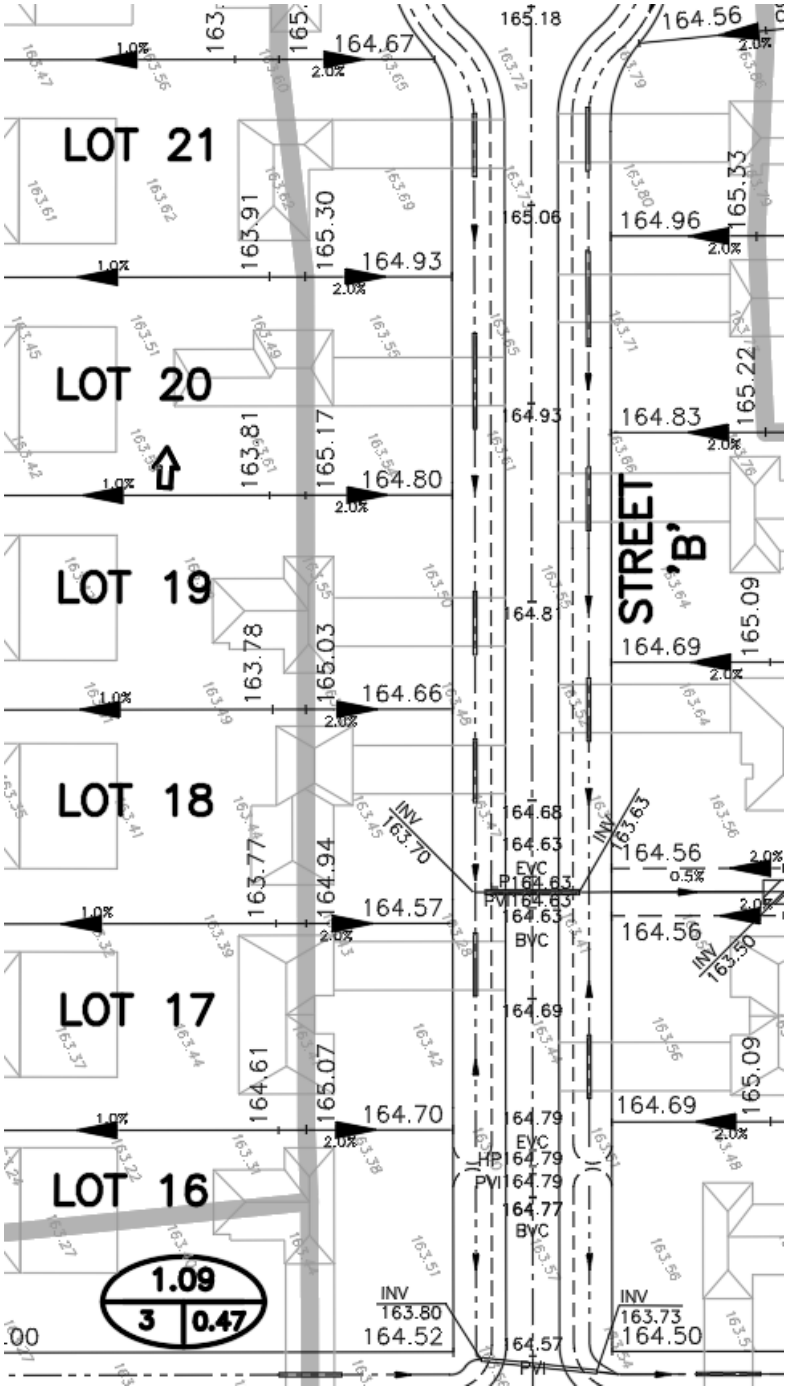
Since water surface elevation at inlet is less than the height of the shoulder, water will not overtop Street B.

Culvert Under Street B to OLF

Design Chart 2.32: Inlet Control: Circular CSP and SPCSP Culverts



Source: Herr (1977)



CULVERT UNDER ST B TO OLF

D.G. BIDDLE & ASSOCIATES
CONSULTING ENGINEERS & PLANNERS

96 King Street East
Oshawa, Ontario, L1H 1B6

Phone: 905-576-8500

info@dgbiddle.com
dgbiddle.com

FIG 7

DRAWN BY:	C.P.J.	CHECKED BY:	M.J.H.	DRAWING NO.	122049
DATE:	JAN 2025	SCALE:	NTS		

Job **5868 County Road 65 Subdivision** 2025-01-28
Job # **122049** 1/1
Culvert Draining Under Street A to Pond B OLF

Area Draining to Culvert (Node 25)			
Material	**Area**	**RC**	**A x I**
Road	0.086	0.9	0.0778
Shoulder	0.020	0.6	0.0120
Landscape	0.152	0.2	0.0304
TOTAL	0.258337		0.1202
	Weighted RC		0.4653
	% IMP =	37.9000%	

Inlet	162.69		
Outlet	162.63		
Q=	0.05	m^3/s	Refer to VH Output in Schedule 2
D =	0.300		
N =	1.00		
H_f/D =	0.89		
H =	0.27	m	

CULVERT DATA					**Inlet Control**	
DESCRIP.	**DIA.**	**NO.**	**Q/N**	**AREA**	**HW/D**	**HW**
	(m)	**N**	**(m^3/s)**	**(m^2)**		**(m)**
7	**8**	**9**	**10**	**11**	**13**	**14**
300mm	0.300	1.00	0.05	0.07	0.89	0.27

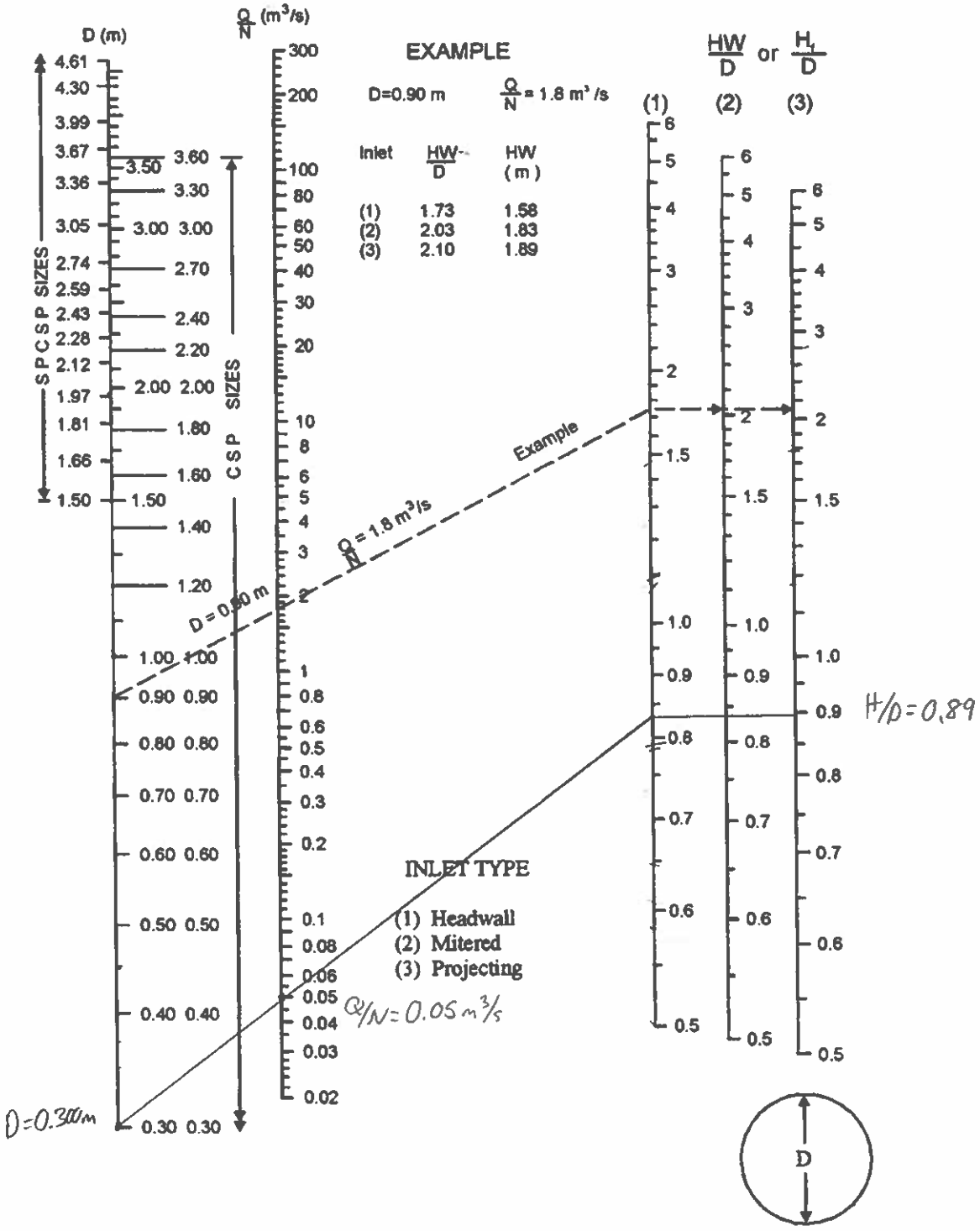
9 NUMBER OF BARRELS
10 COL. 1 / COL. 9
11 AREA PER BARREL
12 BOX CULVERT ONLY
13 DESIGN CHART 2.32
14 COL. 8 x COL. 13

Shoulder Elevation North side of Street A & C Intersection = 163.38
Max WSE @ Inlet = **162.96** < 163.38

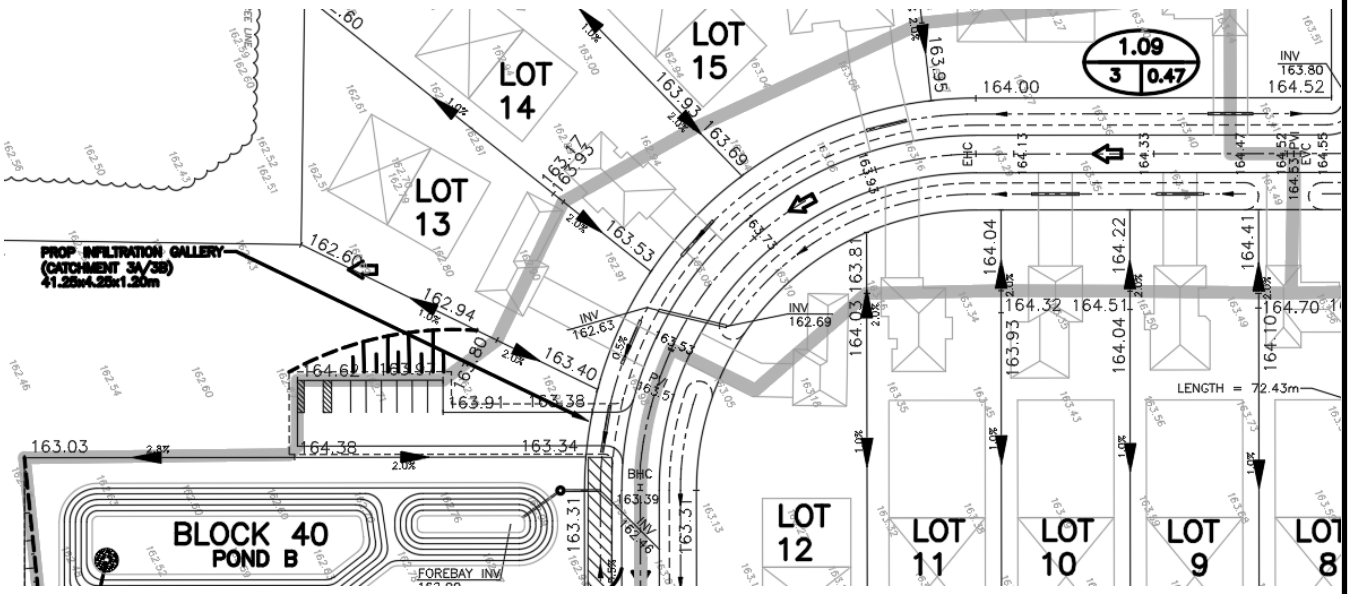
Since water surface elevation at inlet is less than the height of the shoulder, water will not overtop Street A.

Culvert Under Street A to Pond B OLF

Design Chart 2.32: Inlet Control: Circular CSP and SPCSP Culverts



Source: Herr (1977)



CULVERT DRAINING TO POND B OLF

D.G. BIDDLE & ASSOCIATES
CONSULTING ENGINEERS & PLANNERS

96 King Street East
Oshawa, Ontario, L1H 1B6

Phone: 905-576-8500

info@dgbiddle.com
dgbiddle.com

FIG 8

DRAWN BY:	C.P.J.	CHECKED BY:	M.J.H.	DRAWING NO.	122049
DATE:	JAN 2025	SCALE:	NTS		

Job **5868 County Road 65 Subdivision** 2025-01-28

Job # **122049** 1/1

Culvert Design Conveying OLF into Pond BLK 40

Area Draining to Culvert (Node 26)			
Material	**Area**	**RC**	**A x I**
Road	0.237	0.9	0.2131
Shoulder	0.053	0.6	0.0317
Landscape	0.436	0.2	0.0873
TOTAL	0.726143		0.3321

Weighted RC 0.4574

% IMP = 36.7714%

Inlet 162.46

Outlet 162.33

Q= 0.136 m^3/s Refer to VH Output in Schedule 2

D = 0.375

N = 1.00

H_f/D = 1.35

H = 0.51 m

CULVERT DATA					Inlet Control	
DESCRIP.	**DIA.**	**NO.**	**Q/N**	**AREA**	**HW/D**	**HW**
	(m)	**N**	**(m^3/s)**	**(m^2)**		**(m)**
7	**8**	**9**	**10**	**11**	**13**	**14**
375mm	0.375	1.00	0.14	0.11	1.35	0.51

9 NUMBER OF BARRELS

10 COL. 1 / COL. 9

11 AREA PER BARREL

12 BOX CULVERT ONLY

13 DESIGN CHART 2.32

14 COL. 8 x COL. 13

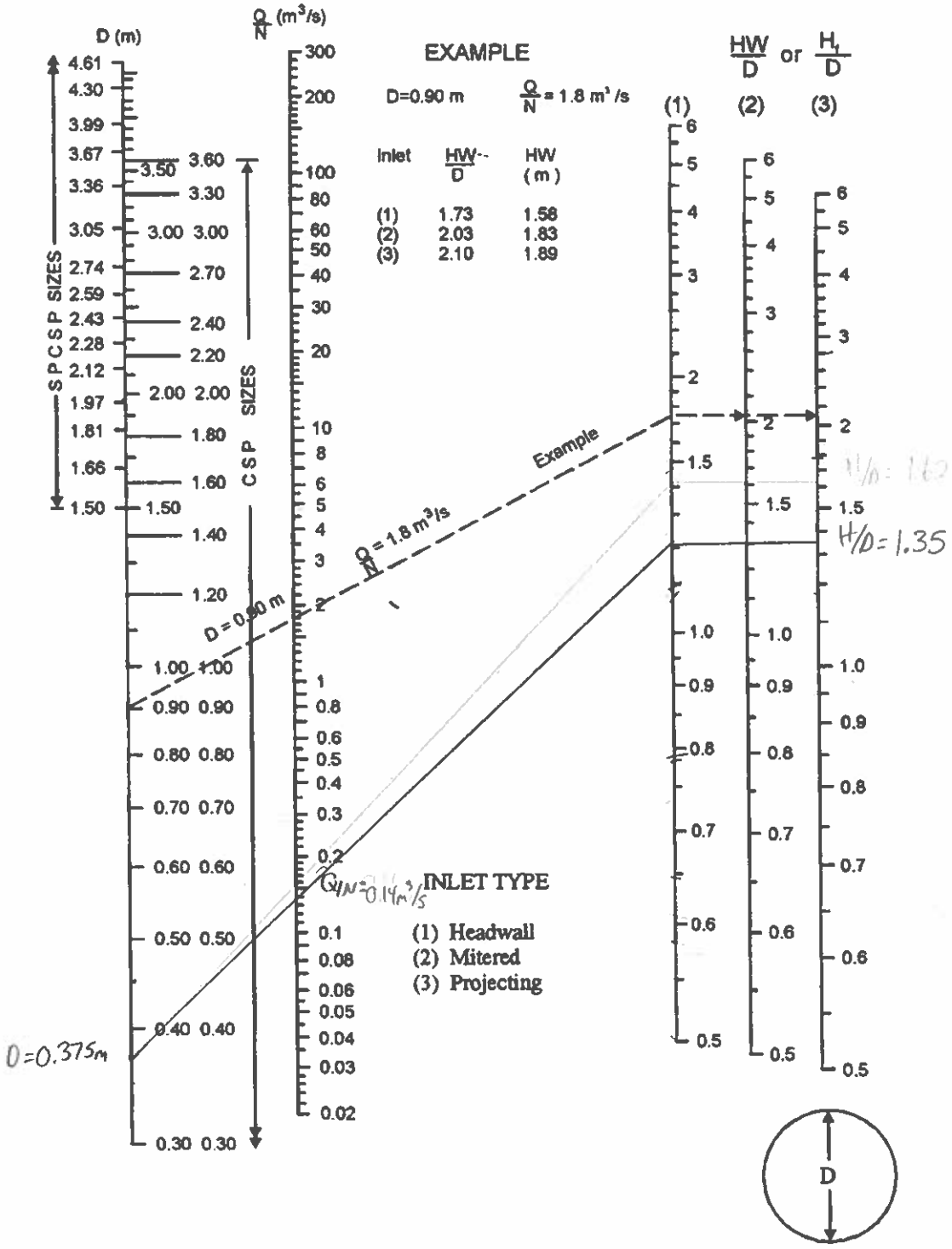
Shoulder Elevation North side of Street A & C Intersection = 163.22

Max WSE @ Inlet = **162.97** < 163.22

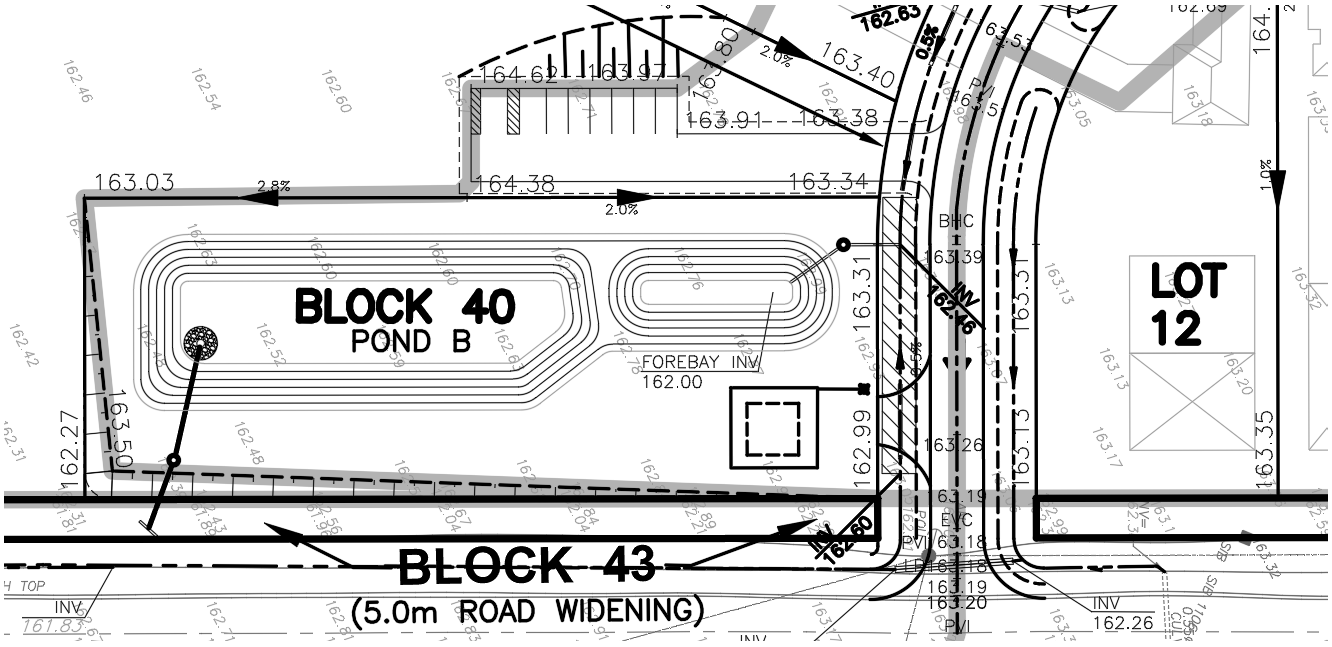
Since water surface elevation at inlet is less than the height of the shoulder, water will not overtop Street B.

Culvert Conveying OLF into Pond Block 40

Design Chart 2.32: Inlet Control: Circular CSP and SPCSP Culverts



Source: Herr (1977)



CULVERT FROM OLF TO POND B

D.G. BIDDLE & ASSOCIATES
CONSULTING ENGINEERS & PLANNERS

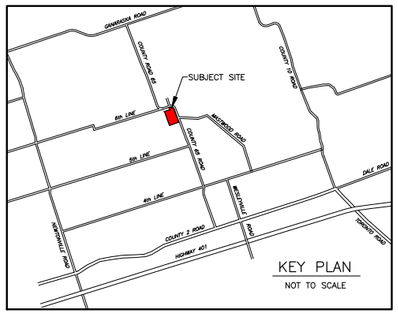
96 King Street East
Oshawa, Ontario, L1H 1B6

Phone: 905-576-8500

info@dgbiddle.com
dgbiddle.com

FIG 9

DRAWN BY:	CHECKED BY:	DRAWING NO.
C.P.J.	M.J.H.	122049
DATE: JAN 2025	SCALE: NTS	



DEVELOPED CATCHMENT DIRECTED TO INFILTRATION FACILITY

DEVELOPED CATCHMENT NOT DIRECTED TO INFILTRATION FACILITY

UNDISTURBED CATCHMENT

3B = 0.59 ha

LEGEND

DRAINAGE BOUNDARY

0.25 / 1 | 90 — DRAINAGE AREA ID/RUN-OFF COEFFICIENT

OVERLAND FLOW DIRECTION

NOTE: THIS PLAN IS FOR STORM DRAINAGE AREAS ONLY

TOPOGRAPHIC INFORMATION

TOPOGRAPHIC INFORMATION OBTAINED FROM TOPOGRAPHIC BASE PLAN OF 5868 COUNTY ROAD 65 MUNICIPALITY OF PORT HOPE BY IBW SURVEYORS DATED JULY 22, 2022

PRELIMINARY NOT FOR CONSTRUCTION

NO.	DATE	REVISION	BY
3.	07 24/2024	REVISED AS PER 3RD SUB COMMENTS	CJ
2.	01 03/2024	REVISED AS PER UPDATED LOT LAYOUT	MH
1.	10 11/2023	REVISED AS PER 1ST SUBMISSION COMMENTS	MH

REVISIONS

5868 COUNTY 65 ROAD, PORT HOPE

POST-DEVELOPMENT STORM DRAINAGE PLAN

D.G. BIDDLE & ASSOCIATES
CONSULTING ENGINEERS & PLANNERS
96 King Street East
Oshawa, Ontario, L1H 1B6
Phone: 905-576-8500
info@dgbiddle.com
dgbiddle.com

SCALE:	1:1000
DRAWN BY:	M.J.H.
DESIGN BY:	M.J.H.
CHECKED BY:	D.D.M.
DATE:	JAN 2023

PROJECT NO. 122049

DRAWING NO. SD-2

X:\STAFF\JOB FILES\122000\122049 5868 COUNTY RD 65\122049 DRAWINGS\122049 DRAWINGS CIVIL\122049 ENGINEERING DRAWINGS\122049-SD-SITE PLAN-1000.DWG

5865 County Road 65
Job File: 122049
Municipality of Port Hope
Dry Hydrant Design Chart

4. Design Flow Rate				713.26	gpm
5. Elevation Above Sea Level				539.70	ft
6. Normal Atmospheric Pressure [From Table I.1(a)]				14.43	psi
7. Lift	Height x 0.434 =	4.17	m x 0.434		
	=	13.68	ft x 0.434 =	5.94	psi
8. Water Temperature Vapour Pressure [From Table I.1(f)]				0.18	psi
9. Pressure Loss at pump intake				5.0	psi
Available Site Pressure					
10. Line 6 minus (Line 7 + 8 + 9)				3.31	psi
11. Pressure Loss in pipe & fittings (From Dry Hydrant Hardware Layout Worksheet)				1.35	psi
12. Pressure Loss from Sudden Reduction [From Table I.1(f)]					
Reduction:	6" x 6"			0	psi
13. Velocity in Suction Pipe [From Table I.1(g)]				0.446	psi
14. Pressure Loss in Suction Hose [From Table I.1(h)]				0.132	psi
15. Pressure to overcome piping and water movement loss Add (Line 11 + 12 + 13 + 14)				1.93	psi
16. Available Site Pressure (ASP) Available Site Pressure = Line 10 - Line 15				1.38	psi

Dry Hydrant Hardware Layout Worksheet

Job No. 122049

Dry Hydrant A

Friction Loss Per Foot (Table I.1e) Based on 713.26 gpm Design Flow: 0.01678 psi

Description & Size	Straight Line Equivalent feet of Pipe	Conversion for Pipe Coefficient	Loss (psi)
Strainer	5.00	0.01678	0.0839
90° Bend (6")	18.92	0.01678	0.317478
90° Bend (6")	18.92	0.01678	0.317478
90° Bend (6")	18.92	0.01678	0.317478
6" PVC Pipe	8.04	0.01678	0.134911
6" PVC Pipe	9.84	0.01678	0.165115
1 ft of 6" pipe	1.00	0.01678	0.01678

Total Loss 1.35 psi

4. Design Flow Rate (L/min to gpm)

2700 L/min = 713.26 gallons per minute

5. Elevation Above Sea Level

164.50m = 539.70 ft

6. Normal Atmospheric Pressure [From Table I.1(a)]

Elevation Above Sea Level: 539.70 feet
Normal Atmospheric Pressure @ 0 ft = 14.70 psi
Normal Atmospheric Pressure @ 1000 ft = 14.20 psi

Normal Atmosperic Pressure @ 539.70 ft

14.70 - [(539.7/1000)*(14.70-14.20)] = 14.43 psi

7. Lift

Lift = Depth from FDC to Pipe Invert (Refer to Detail on Site Sevicing Drawing)
Lift = 2.10 + 0.3 + 0.6 = 3.00m = 9.84 ft
Lift = 9.84 ft x 0.434 = 4.27 psi

8. Vapour Pressure

Assume a water temperature of 50 Fahrenheit
From Table I.1(b): Vapour Pressure = 0.180 psi

10. Available Site Pressure

Atmospheric Pressure - Lift - Vapour Pressure - Pressure Loss @ Pump Intake
= 14.43 - 4.27 - 0.18 - 5.0 = **4.98 psi**

11. Friction Loss Per Foot of Pipe (psi)

Based on a Design Flow Rate of 713.26 gpm
Friction Loss/Foot of Pipe = 0.01678 psi [From Table I.1(e)]

12. Pressure Loss from Sudden Reduction

Since system is a 6" pipe, no reduction required.
Pressure Loss = 0 psi [From Table I.1(f)]

13. Velocity in Suction Pipe

Based on a Design Flow Rate of 713.26 gpm
Velocity in Suction Pipe = 0.446 psi [From Table I.1(g)]

14. Pressure Loss in Suction Hose

Based on a Design Flow Rate of 713.26 gpm
Pressure Loss in Section Hose = 0.132 psi [From Table I.1(h)]

5865 County Road 65 **4/4**
Job File: 122049
Municipality of Port Hope
Water Storage Tank Design Calculations

Building Classification from Table 3.1.2.1: Type C - Residential Occupancies

Water Supply Coefficient (K): 23 (Table 1 - OBC Appendix A , Vol. 2)

Building Volume

Assume Average House Square Footage of 3500 ft^2 (325.16m^2)and Average Building Height of 10m (3.00m basement, 3.00m 1st & second floors, 1.00m roof pitch)

Average House Volume = (325.16 x 10) = 3251.61 m^3

Spatial Coefficient

*Assume an average exposure distance of 9.5m for distance between houses

S_{side} = 0.05 (From Figure 1 - OBC Appendix A, Vol. 2)

S_{side} = 0.00 (Front & Back of House)

S_{tot} = 1.0 + [Sside + Sside2 + Sside3 + Sside 4] = 1.0 + [0.05 + 0.05 + 0 + 0]

S_{tot} = 1.1

Requred Minimum Water Supply Flow Rate (L/min)

$Q = KVS_{tot}$ = (23 x 3251.61 x 1.1) = 82265.63 L

As per Table 2 , since Q <= 108,000 L:

Required Minimum Water Supply Flow Rate = 2700 L/min

Minimum 30 Minute Water Supply Based on Table 2 Flow Rate

Water Supply Flow Rate = 2700 L/min

Water Supply = 65000 L

A minimum Water Supply of 30 minutes is required

Water Supply/Water Supply Flow Rate = 82265.60/2700 = 30.47 minutes

Since 30.47 minutes > 30 minutes required, a storage tank is to be sized to hold 82,270 L (82.27 m^3).

Note: While the tank is shown as being 2.15m deep, we cannot draw down the bottom 6" of water below the strainer, so only 2.00m can be counted towards the storage volume.

Length: 6.50
Width: 6.50
Height: 2.00

Volume = (6.50 x 6.50 x 2.00) = 84.50 m^3

Since 84.50 m^3 > 82.27 m^3, a storage tank 6.50m long, 6.50m wide and 2.15m deep will provide the required on site water supply for fire protection.

Stormceptor®

Rinker MATERIALS™

Stormceptor® EF Sizing Report

Imbrium® Systems
ESTIMATED NET ANNUAL SEDIMENT (TSS) LOAD REDUCTION

01/29/2025

Province:	Ontario
City:	Port Hope
Nearest Rainfall Station:	PETERBOROUGH
Climate Station Id:	6166456
Years of Rainfall Data:	15

Site Name:	

Drainage Area (ha):	1.10
% Imperviousness:	38.73

Runoff Coefficient 'c': 0.53

Particle Size Distribution:	Fine
Target TSS Removal (%):	80.0

Required Water Quality Runoff Volume Capture (%):	
Estimated Water Quality Flow Rate (L/s):	21.13
Oil / Fuel Spill Risk Site?	No
Upstream Flow Control?	No
Peak Conveyance (maximum) Flow Rate (L/s):	
Influent TSS Concentration (mg/L):	
Estimated Average Annual Sediment Volume (L/yr):	388

Project Name:	5868 County Road 65
Project Number:	65315
Designer Name:	Curtis Johnston
Designer Company:	D.G. Biddle & Associates Ltd.
Designer Email:	curtis.johnston@dgbiddle.com
Designer Phone:	905-809-0295
EOR Name:	
EOR Company:	
EOR Email:	
EOR Phone:	

Net Annual Sediment (TSS) Load Reduction Sizing Summary

Stormceptor Model	TSS Removal Provided (%)
EF4	83
EF5	87
EF6	91
EF8	95
EF10	97

Recommended Stormceptor EF Model: EF4

Estimated Net Annual Sediment (TSS) Load Reduction (%): 83

Water Quality Runoff Volume Capture (%): > 90

imbrium

THIRD-PARTY TESTING AND VERIFICATION

►**Stormceptor® EF and Stormceptor® EFO** are the latest evolutions in the Stormceptor® oil-grit separator (OGS) technology series, and are designed to remove a wide variety of pollutants from stormwater and snowmelt runoff. These technologies have been third-party tested in accordance with the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators** and performance has been third-party verified in accordance with the **ISO 14034 Environmental Technology Verification (ETV)** protocol.

PERFORMANCE

►**Stormceptor® EF and EFO** remove stormwater pollutants through gravity separation and floatation, and feature a patent-pending design that generates positive removal of total suspended solids (TSS) throughout each storm event, including high-intensity storms. Captured pollutants include sediment, free oils, and sediment-bound pollutants such as nutrients, heavy metals, and petroleum hydrocarbons. Stormceptor is sized to remove a high level of TSS from the frequent rainfall events that contribute the vast majority of annual runoff volume and pollutant load. The technology incorporates an internal bypass to convey excessive stormwater flows from high-intensity storms through the device without resuspension and washout (scour) of previously captured pollutants. Proper routine maintenance ensures high pollutant removal performance and protection of downstream waterwavs.

PARTICLE SIZE DISTRIBUTION (PSD)

►The **Canadian ETV PSD** shown in the table below was used, or in part, for this sizing. This is the identical PSD that is referenced in the Canadian ETV ***Procedure for Laboratory Testing of Oil-Grit Separators*** for both sediment removal testing and scour testing. The Canadian ETV PSD contains a wide range of particle sizes in the sand and silt fractions, and is considered reasonably representative of the particle size fractions found in typical urban stormwater runoff.

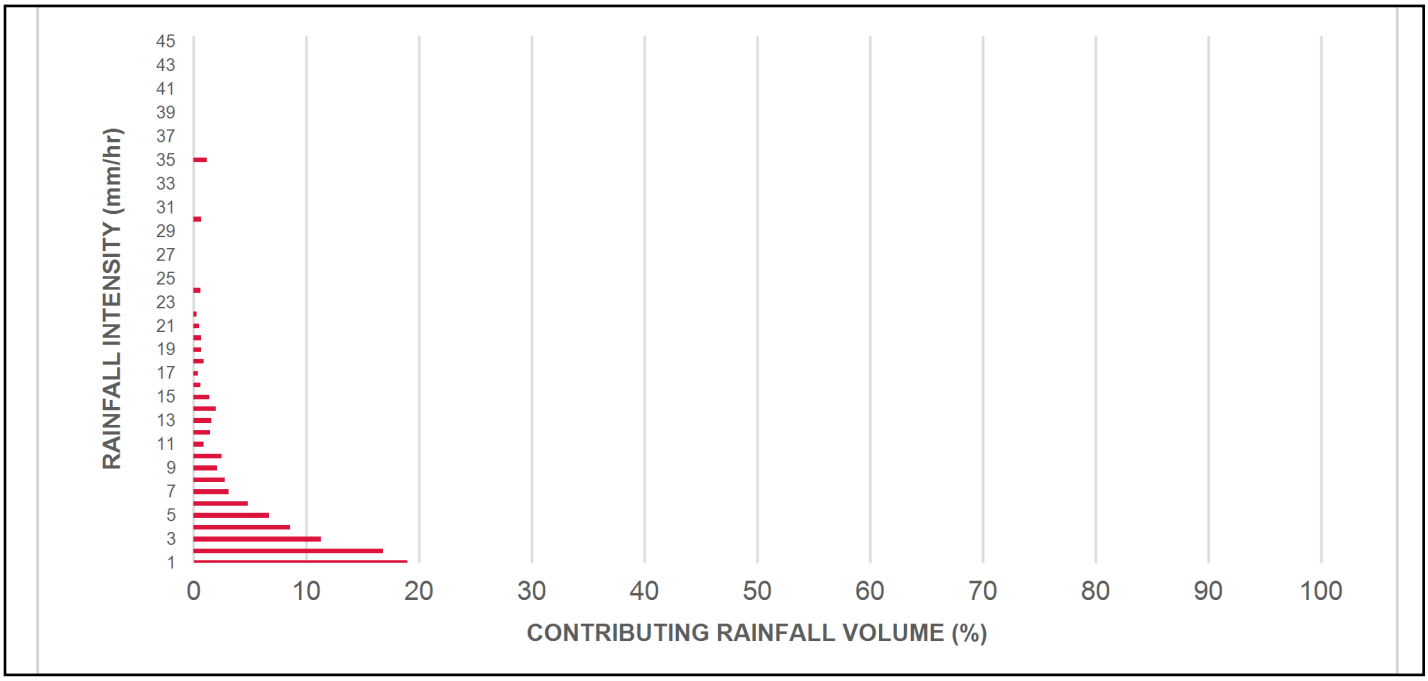
Particle Size (µm)	Percent Less Than	Particle Size Fraction (µm)	Percent
1000	100	500-1000	5
500	95	250-500	5
250	90	150-250	15
150	75	100-150	15
100	60	75-100	10
75	50	50-75	5
50	45	20-50	10
20	35	8-20	15
8	20	5-8	10
5	10	2-5	5
2	5	<2	5

Stormceptor® EF Sizing Report

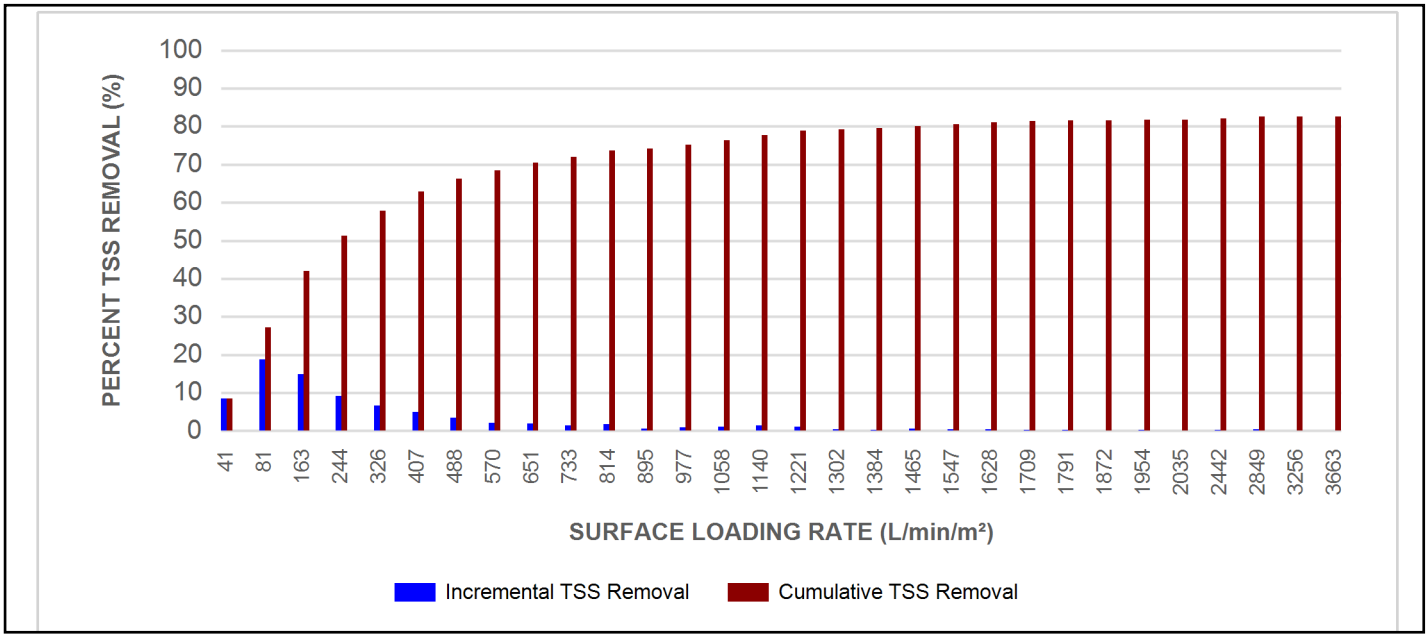
Rainfall Intensity (mm / hr)	Percent Rainfall Volume (%)	Cumulative Rainfall Volume (%)	Flow Rate (L/s)	Flow Rate (L/min)	Surface Loading Rate (L/min/m²)	Removal Efficiency (%)	Incremental Removal (%)	Cumulative Removal (%)
0.50	8.5	8.5	0.81	49.0	41.0	100	8.5	8.5
1.00	19.0	27.5	1.63	98.0	81.0	98	18.7	27.2
2.00	16.8	44.3	3.26	195.0	163.0	88	14.8	42.0
3.00	11.3	55.6	4.88	293.0	244.0	81	9.2	51.2
4.00	8.6	64.2	6.51	391.0	326.0	78	6.6	57.9
5.00	6.7	70.9	8.14	488.0	407.0	74	4.9	62.8
6.00	4.8	75.6	9.77	586.0	488.0	73	3.5	66.3
7.00	3.1	78.7	11.40	684.0	570.0	71	2.2	68.4
8.00	2.8	81.5	13.02	781.0	651.0	70	2.0	70.4
9.00	2.1	83.6	14.65	879.0	733.0	70	1.4	71.9
10.00	2.5	86.1	16.28	977.0	814.0	69	1.7	73.6
11.00	0.9	87.0	17.91	1074.0	895.0	69	0.6	74.2
12.00	1.5	88.5	19.54	1172.0	977.0	68	1.0	75.2
13.00	1.6	90.0	21.16	1270.0	1058.0	69	1.1	76.3
14.00	2.0	92.0	22.79	1368.0	1140.0	70	1.4	77.7
15.00	1.4	93.5	24.42	1465.0	1221.0	72	1.0	78.8
16.00	0.6	94.1	26.05	1563.0	1302.0	73	0.4	79.2
17.00	0.4	94.5	27.68	1661.0	1384.0	75	0.3	79.5
18.00	0.9	95.3	29.30	1758.0	1465.0	72	0.6	80.1
19.00	0.7	96.0	30.93	1856.0	1547.0	69	0.5	80.6
20.00	0.7	96.7	32.56	1954.0	1628.0	65	0.5	81.0
21.00	0.5	97.2	34.19	2051.0	1709.0	62	0.3	81.4
22.00	0.3	97.5	35.82	2149.0	1791.0	59	0.2	81.5
23.00	0.0	97.5	37.44	2247.0	1872.0	56	0.0	81.5
24.00	0.6	98.1	39.07	2344.0	1954.0	54	0.3	81.8
25.00	0.0	98.1	40.70	2442.0	2035.0	52	0.0	81.8
30.00	0.7	98.8	48.84	2930.0	2442.0	43	0.3	82.1
35.00	1.2	100.0	56.98	3419.0	2849.0	38	0.5	82.6
40.00	0.0	100.0	65.12	3907.0	3256.0	33	0.0	82.6
45.00	0.0	100.0	73.26	4396.0	3663.0	29	0.0	82.6
Estimated Net Annual Sediment (TSS) Load Reduction =								**83 %**

Climate Station ID: 6166456 *Years of Rainfall Data*: 15

RAINFALL DATA FROM PETERBOROUGH RAINFALL STATION



INCREMENTAL AND CUMULATIVE TSS REMOVAL FOR THE RECOMMENDED STORMCEPTOR® MODEL



Maximum Pipe Diameter / Peak Conveyance

Stormceptor EF / EFO	Model Diameter		Min Angle Inlet / Outlet Pipes	Max Inlet Pipe Diameter		Max Outlet Pipe Diameter		Peak Conveyance Flow Rate	
	(m)	(ft)		(mm)	(in)	(mm)	(in)	(L/s)	(cfs)
EF4 / EFO4	1.2	4	90	609	24	609	24	425	15
EF5 / EFO5	1.5	5	90	762	30	762	30	710	25
EF6 / EFO6	1.8	6	90	914	36	914	36	990	35
EF8 / EFO8	2.4	8	90	1219	48	1219	48	1700	60
EF10 / EFO10	3.0	10	90	1828	72	1828	72	2830	100
EF12 / EFO12	3.6	12	90	1828	72	1828	72	2830	100

SCOUR PREVENTION AND ONLINE CONFIGURATION

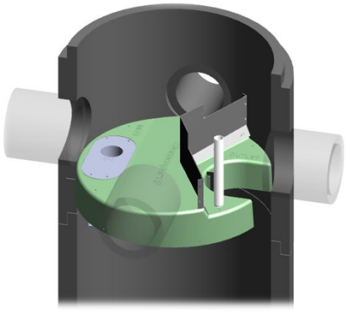
►**Stormceptor® EF and EFO** feature an internal bypass and superior scour prevention technology that have been demonstrated in third-party testing according to the scour testing provisions of the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators**, and the exceptional scour test performance has been third-party verified in accordance with the ISO 14034 ETV protocol. As a result, Stormceptor EF and EFO are approved for online installation, eliminating the need for costly additional bypass structures, piping, and installation expense.

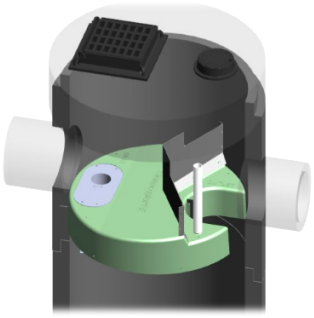
DESIGN FLEXIBILITY

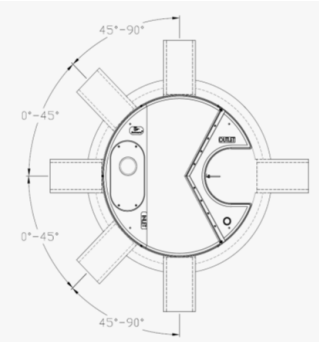
►**Stormceptor® EF** and **EFO** offers design flexibility in one simplified platform, accepting stormwater flow from a single inlet pipe or multiple inlet pipes, and/or surface runoff through an inlet grate. The device can also serve as a junction structure, accommodate a 90-degree inlet-to-outlet bend angle, and can be modified to ensure performance in submerged conditions.

OIL CAPTURE AND RETENTION

►While Stormceptor® EF will capture and retain oil from dry weather spills and low intensity runoff, **Stormceptor® EFO** has demonstrated superior oil capture and greater than 99% oil retention in third-party testing according to the light liquid re-entrainment testing provisions of the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators**. Stormceptor EFO is recommended for sites where oil capture and retention is a requirement.







INLET-TO-OUTLET DROP

Elevation differential between inlet and outlet pipe inverts is dictated by the angle at which the inlet pipe(s) enters the unit.

0° - 45° : The inlet pipe is 1-inch (25mm) higher than the outlet pipe.

45° - 90° : The inlet pipe is 2-inches (50mm) higher than the outlet pipe.

HEAD LOSS

The head loss through Stormceptor EF is similar to that of a 60-degree bend structure. The applicable K value for calculating minor losses through the unit is 1.1. For submerged conditions the applicable K value is 3.0.

Pollutant Capacity

Stormceptor EF / EFO	Model Diameter		Depth (Outlet Pipe Invert to Sump Floor)		Oil Volume		Recommended Sediment Maintenance Depth *		Maximum Sediment Volume *		Maximum Sediment Mass **	
	(m)	(ft)	(m)	(ft)	(L)	(Gal)	(mm)	(in)	(L)	(ft^3)	(kg)	(lb)
EF4 / EFO4	1.2	4	1.52	5.0	265	70	203	8	1190	42	1904	5250
EF5 / EFO5	1.5	5	1.62	5.3	420	111	305	10	2124	75	2612	5758
EF6 / EFO6	1.8	6	1.93	6.3	610	160	305	12	3470	123	5552	15375
EF8 / EFO8	2.4	8	2.59	8.5	1070	280	610	24	8780	310	14048	38750
EF10 / EFO10	3.0	10	3.25	10.7	1670	440	610	24	17790	628	28464	78500
EF12 / EFO12	3.6	12	3.89	12.8	2475	655	610	24	31220	1103	49952	137875

*Increased sump depth may be added to increase sediment storage capacity

** Average density of wet packed sediment in sump = 1.6 kg/L (100 lb/ft^3)

Feature	Benefit	Feature Appeals To
Patent-pending enhanced flow treatment and scour prevention technology	Superior, verified third-party performance	Regulator, Specifying & Design Engineer
Third-party verified light liquid capture and retention for EFO version	Proven performance for fuel/oil hotspot locations	Regulator, Specifying & Design Engineer, Site Owner
Functions as bend, junction or inlet structure	Design flexibility	Specifying & Design Engineer
Minimal drop between inlet and outlet	Site installation ease	Contractor
Large diameter outlet riser for inspection and maintenance	Easy maintenance access from grade	Maintenance Contractor & Site Owner

STANDARD STORMCEPTOR EF/EFO DRAWINGS

For standard details, please visit http://www.imbriumsystems.com/stormwater-treatment-solutions/stormceptor-ef

STANDARD STORMCEPTOR EF/EFO SPECIFICATION

For specifications, please visit http://www.imbriumsystems.com/stormwater-treatment-solutions/stormceptor-ef

STANDARD PERFORMANCE SPECIFICATION FOR "OIL GRIT SEPARATOR" (OGS) STORMWATER QUALITY TREAMENT DEVICE

PART 1 – GENERAL

1.1 WORK INCLUDED

This section specifies requirements for selecting, sizing, and designing an underground Oil Grit Separator (OGS) device for stormwater quality treatment, with third-party testing results and a Statement of Verification in accordance with ISO 14034 Environmental Management – Environmental Technology Verification (ETV).

1.2 REFERENCE STANDARDS & PROCEDURES

ISO 14034:2016 Environmental management – Environmental technology verification (ETV)

Canadian Environmental Technology Verification (ETV) Program's **Procedure for Laboratory Testing of Oil-Grit Separators.**

1.3 SUBMITTALS

1.3.1 All submittals, including sizing reports & shop drawings, shall be submitted upon request with each order to the contractor then forwarded to the Engineer of Record for review and acceptance. Shop drawings shall detail all OGS components, elevations, and sequence of construction.

1.3.2 Alternative devices shall have features identical to or greater than the specified device, including: treatment chamber diameter, treatment chamber wet volume, sediment storage volume, and oil storage volume.

1.3.3 Unless directed otherwise by the Engineer of Record, OGS stormwater quality treatment product substitutions or alternatives submitted within ten days prior to project bid shall not be accepted. All alternatives or substitutions submitted shall be signed and sealed by a local registered Professional Engineer, based on the exact same criteria detailed in Section 3, in entirety, subject to review and approval by the Engineer of Record.

PART 2 – PRODUCTS

2.1 OGS POLLUTANT STORAGE

The OGS device shall include a sump for sediment storage, and a protected volume for the capture and storage of petroleum hydrocarbons and buoyant gross pollutants. The **minimum** sediment & petroleum hydrocarbon storage capacity shall be as follows:

2.1.1	4 ft (1219 mm) Diameter OGS Units:	1.19 m^3 sediment / 265 L oil
	5 ft (1524 mm) Diameter OGS Units:	1.95 m^3 sediment / 420L oil
	6 ft (1829 mm) Diameter OGS Units:	3.48 m^3 sediment / 609 L oil
	8 ft (2438 mm) Diameter OGS Units:	8.78 m^3 sediment / 1,071 L oil
	10 ft (3048 mm) Diameter OGS Units:	17.78 m^3 sediment / 1,673 L oil
	12 ft (3657 mm) Diameter OGS Units:	31.23 m^3 sediment / 2,476 L oil

PART 3 – PERFORMANCE & DESIGN

3.1 GENERAL

The OGS stormwater quality treatment device shall be verified in accordance with ISO 14034:2016 Environmental management – Environmental technology verification (ETV). The OGS stormwater quality treatment device shall remove oil, sediment and gross pollutants from stormwater runoff during frequent wet weather events, and retain these pollutants during less frequent high flow wet weather events below the insert within the OGS for later removal during maintenance. The Manufacturer shall have at least ten (10) years of local experience, history and success in engineering design, manufacturing and production and supply of OGS stormwater quality treatment device systems, acceptable to the Engineer of Record.

3.2 SIZING METHODOLOGY

The OGS device shall be engineered, designed and sized to provide stormwater quality treatment based on treating a minimum of 90 percent of the average annual runoff volume and a minimum removal of an annual average 60% of the sediment (TSS) load based on the Particle Size Distribution (PSD) specified in the sizing report for the specified device. Sizing of the OGS shall be determined by use of a minimum ten (10) years of local historical rainfall data provided by Environment Canada. Sizing shall also be determined by use of the sediment removal performance data derived from the ISO 14034 ETV third-party verified laboratory testing data from testing conducted in accordance with the Canadian ETV protocol Procedure for Laboratory Testing of Oil-Grit Separators, as follows:

3.2.1 Sediment removal efficiency for a given surface loading rate and its associated flow rate shall be based on sediment removal efficiency demonstrated at the seven (7) tested surface loading rates specified in the protocol, ranging 40 L/min/m^2 to 1400 L/min/m^2, and as stated in the ISO 14034 ETV Verification Statement for the OGS device.

3.2.2 Sediment removal efficiency for surface loading rates between 40 L/min/m^2 and 1400 L/min/m^2 shall be based on linear interpolation of data between consecutive tested surface loading rates.

3.2.3 Sediment removal efficiency for surface loading rates less than the lowest tested surface loading rate of 40 L/min/m^2 shall be assumed to be identical to the sediment removal efficiency at 40 L/min/m^2. No extrapolation shall be allowed that results in a sediment removal efficiency that is greater than that demonstrated at 40 L/min/m^2.

3.2.4 Sediment removal efficiency for surface loading rates greater than the highest tested surface loading rate of 1400 L/min/m^2 shall assume zero sediment removal for the portion of flow that exceeds 1400 L/min/m^2, and shall be calculated using a simple proportioning formula, with 1400 L/min/m^2 in the numerator and the higher surface loading rate in the denominator, and multiplying the resulting fraction times the sediment removal efficiency at 1400 L/min/m^2.

The OGS device shall also have sufficient annual sediment storage capacity as specified and calculated in Section 2.1.

3.3 CANADIAN ETV or ISO 14034 ETV VERIFICATION OF SCOUR TESTING

The OGS device shall have Canadian ETV or ISO 14034 ETV Verification of third-party scour testing conducted in accordance with the Canadian ETV Program's **Procedure for Laboratory Testing of Oil-Grit Separators.**

3.3.1 To be acceptable for on-line installation, the OGS device must demonstrate an average scour test effluent concentration less than 10 mg/L at each surface loading rate tested, up to and including 2600 L/min/m^2.

Stormceptor®

Rinker MATERIALS™

Stormceptor® EF Sizing Report

Imbrium® Systems
ESTIMATED NET ANNUAL SEDIMENT (TSS) LOAD REDUCTION

01/29/2025

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Nearest Rainfall Station:	PETERBOROUGH
Climate Station Id:	6166456
Years of Rainfall Data:	15

Site Name:	

Drainage Area (ha):	4.00
% Imperviousness:	25.96

Runoff Coefficient 'c': 0.45

Project Name:	5868 County Road 65
Project Number:	65315
Designer Name:	Curtis Johnston
Designer Company:	D.G. Biddle & Associates Ltd.
Designer Email:	curtis.johnston@dgbiddle.com
Designer Phone:	905-809-0295
EOR Name:	
EOR Company:	
EOR Email:	
EOR Phone:	

Particle Size Distribution:	Fine
Target TSS Removal (%):	60.0

Required Water Quality Runoff Volume Capture (%):	
Estimated Water Quality Flow Rate (L/s):	65.79
Oil / Fuel Spill Risk Site?	No
Upstream Flow Control?	No
Peak Conveyance (maximum) Flow Rate (L/s):	
Influent TSS Concentration (mg/L):	
Estimated Average Annual Sediment Volume (L/yr):	751

Net Annual Sediment (TSS) Load Reduction Sizing Summary

Stormceptor Model	TSS Removal Provided (%)
EF4	66
EF5	73
EF6	78
EF8	85
EF10	89
EF12	92

Recommended Stormceptor EF Model: EF4

Estimated Net Annual Sediment (TSS) Load Reduction (%): 66

Water Quality Runoff Volume Capture (%): > 90

imbrium

THIRD-PARTY TESTING AND VERIFICATION

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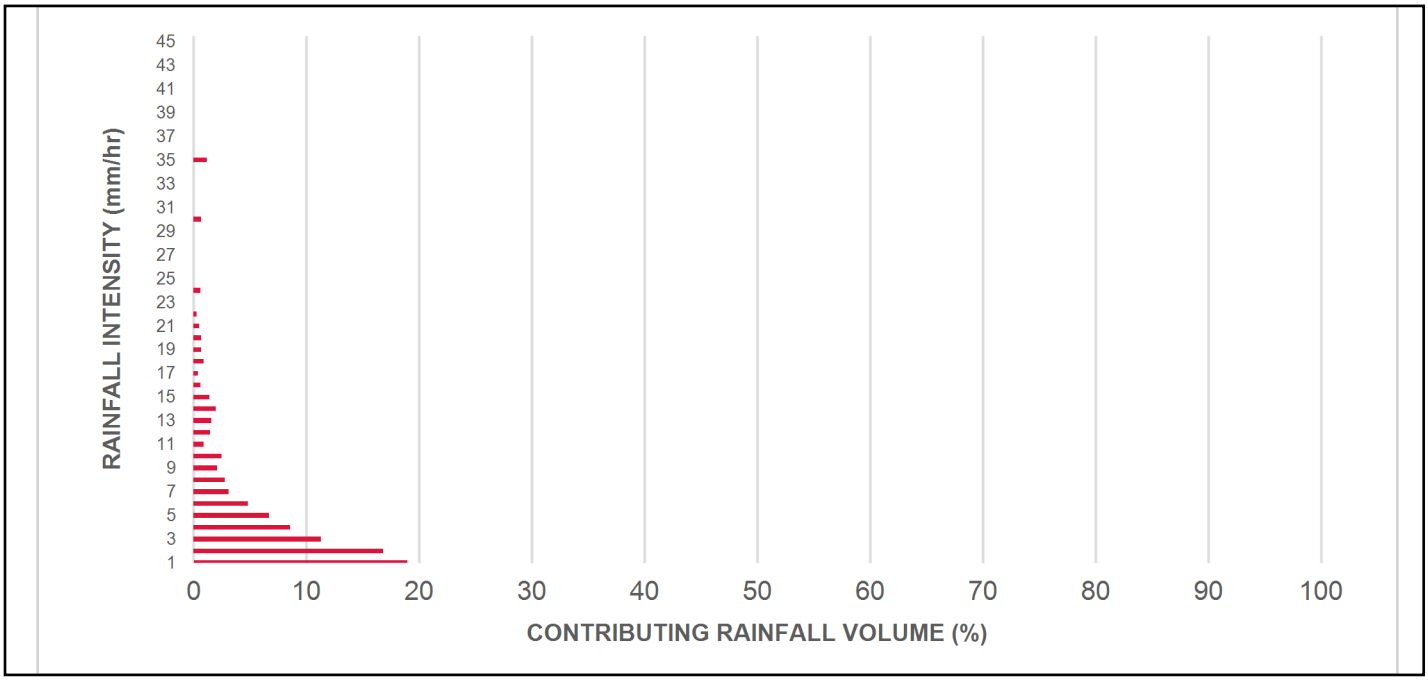
Particle Size (µm)	Percent Less Than	Particle Size Fraction (µm)	Percent
1000	100	500-1000	5
500	95	250-500	5
250	90	150-250	15
150	75	100-150	15
100	60	75-100	10
75	50	50-75	5
50	45	20-50	10
20	35	8-20	15
8	20	5-8	10
5	10	2-5	5
2	5	<2	5

Stormceptor® EF Sizing Report

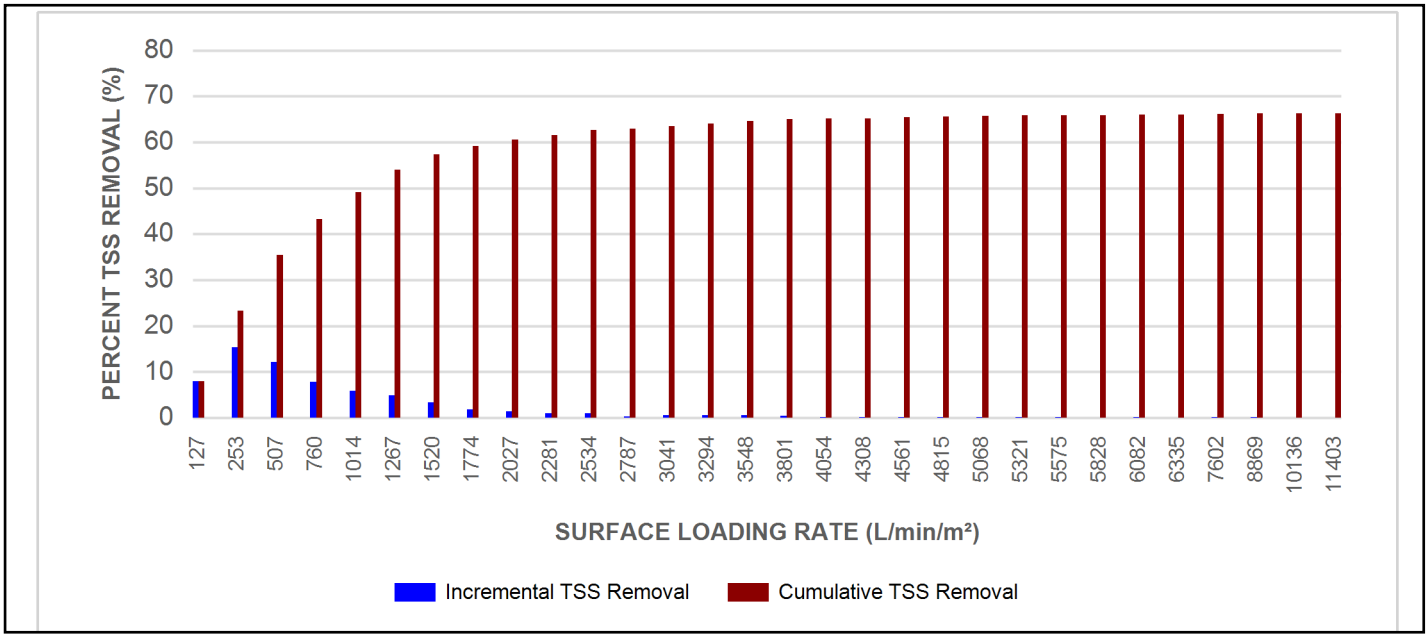
Rainfall Intensity (mm / hr)	Percent Rainfall Volume (%)	Cumulative Rainfall Volume (%)	Flow Rate (L/s)	Flow Rate (L/min)	Surface Loading Rate (L/min/m²)	Removal Efficiency (%)	Incremental Removal (%)	Cumulative Removal (%)
0.50	8.5	8.5	2.53	152.0	127.0	93	7.9	7.9
1.00	19.0	27.5	5.07	304.0	253.0	81	15.4	23.3
2.00	16.8	44.3	10.14	608.0	507.0	72	12.1	35.4
3.00	11.3	55.6	15.20	912.0	760.0	70	7.9	43.3
4.00	8.6	64.2	20.27	1216.0	1014.0	68	5.8	49.1
5.00	6.7	70.9	25.34	1520.0	1267.0	73	4.9	54.0
6.00	4.8	75.6	30.41	1824.0	1520.0	69	3.3	57.3
7.00	3.1	78.7	35.48	2129.0	1774.0	60	1.8	59.1
8.00	2.8	81.5	40.54	2433.0	2027.0	52	1.5	60.6
9.00	2.1	83.6	45.61	2737.0	2281.0	46	1.0	61.5
10.00	2.5	86.1	50.68	3041.0	2534.0	42	1.1	62.6
11.00	0.9	87.0	55.75	3345.0	2787.0	39	0.4	62.9
12.00	1.5	88.5	60.82	3649.0	3041.0	35	0.5	63.5
13.00	1.6	90.0	65.88	3953.0	3294.0	33	0.5	64.0
14.00	2.0	92.0	70.95	4257.0	3548.0	30	0.6	64.6
15.00	1.4	93.5	76.02	4561.0	3801.0	28	0.4	65.0
16.00	0.6	94.1	81.09	4865.0	4054.0	26	0.2	65.1
17.00	0.4	94.5	86.16	5169.0	4308.0	25	0.1	65.2
18.00	0.9	95.3	91.22	5473.0	4561.0	23	0.2	65.4
19.00	0.7	96.0	96.29	5778.0	4815.0	22	0.2	65.6
20.00	0.7	96.7	101.36	6082.0	5068.0	21	0.2	65.7
21.00	0.5	97.2	106.43	6386.0	5321.0	20	0.1	65.8
22.00	0.3	97.5	111.50	6690.0	5575.0	19	0.1	65.9
23.00	0.0	97.5	116.57	6994.0	5828.0	18	0.0	65.9
24.00	0.6	98.1	121.63	7298.0	6082.0	18	0.1	66.0
25.00	0.0	98.1	126.70	7602.0	6335.0	17	0.0	66.0
30.00	0.7	98.8	152.04	9122.0	7602.0	14	0.1	66.1
35.00	1.2	100.0	177.38	10643.0	8869.0	12	0.1	66.2
40.00	0.0	100.0	202.72	12163.0	10136.0	11	0.0	66.2
45.00	0.0	100.0	228.06	13684.0	11403.0	11	0.0	66.2
Estimated Net Annual Sediment (TSS) Load Reduction =								**66 %**

Climate Station ID: 6166456 *Years of Rainfall Data*: 15

RAINFALL DATA FROM PETERBOROUGH RAINFALL STATION



INCREMENTAL AND CUMULATIVE TSS REMOVAL FOR THE RECOMMENDED STORMCEPTOR® MODEL



Maximum Pipe Diameter / Peak Conveyance

Stormceptor EF / EFO	Model Diameter		Min Angle Inlet / Outlet Pipes	Max Inlet Pipe Diameter		Max Outlet Pipe Diameter		Peak Conveyance Flow Rate	
	(m)	(ft)		(mm)	(in)	(mm)	(in)	(L/s)	(cfs)
EF4 / EFO4	1.2	4	90	609	24	609	24	425	15
EF5 / EFO5	1.5	5	90	762	30	762	30	710	25
EF6 / EFO6	1.8	6	90	914	36	914	36	990	35
EF8 / EFO8	2.4	8	90	1219	48	1219	48	1700	60
EF10 / EFO10	3.0	10	90	1828	72	1828	72	2830	100
EF12 / EFO12	3.6	12	90	1828	72	1828	72	2830	100

SCOUR PREVENTION AND ONLINE CONFIGURATION

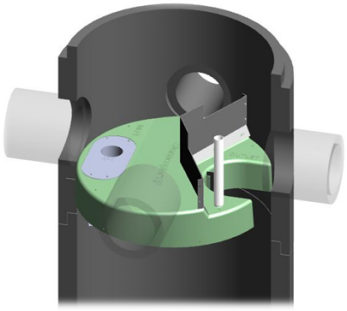
►**Stormceptor® EF and EFO** feature an internal bypass and superior scour prevention technology that have been demonstrated in third-party testing according to the scour testing provisions of the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators**, and the exceptional scour test performance has been third-party verified in accordance with the ISO 14034 ETV protocol. As a result, Stormceptor EF and EFO are approved for online installation, eliminating the need for costly additional bypass structures, piping, and installation expense.

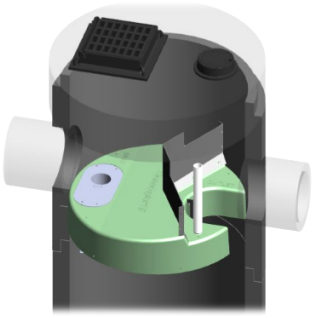
DESIGN FLEXIBILITY

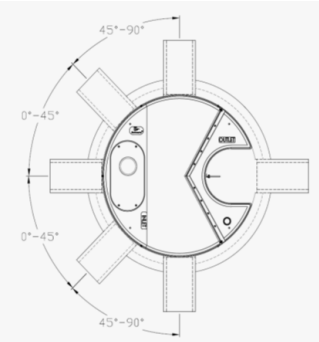
►**Stormceptor® EF** and **EFO** offers design flexibility in one simplified platform, accepting stormwater flow from a single inlet pipe or multiple inlet pipes, and/or surface runoff through an inlet grate. The device can also serve as a junction structure, accommodate a 90-degree inlet-to-outlet bend angle, and can be modified to ensure performance in submerged conditions.

OIL CAPTURE AND RETENTION

►While Stormceptor® EF will capture and retain oil from dry weather spills and low intensity runoff, **Stormceptor® EFO** has demonstrated superior oil capture and greater than 99% oil retention in third-party testing according to the light liquid re-entrainment testing provisions of the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators**. Stormceptor EFO is recommended for sites where oil capture and retention is a requirement.







INLET-TO-OUTLET DROP

Elevation differential between inlet and outlet pipe inverts is dictated by the angle at which the inlet pipe(s) enters the unit.

0° - 45° : The inlet pipe is 1-inch (25mm) higher than the outlet pipe.

45° - 90° : The inlet pipe is 2-inches (50mm) higher than the outlet pipe.

HEAD LOSS

The head loss through Stormceptor EF is similar to that of a 60-degree bend structure. The applicable K value for calculating minor losses through the unit is 1.1. For submerged conditions the applicable K value is 3.0.

Pollutant Capacity

Stormceptor EF / EFO	Model Diameter		Depth (Outlet Pipe Invert to Sump Floor)		Oil Volume		Recommended Sediment Maintenance Depth *		Maximum Sediment Volume *		Maximum Sediment Mass **	
	(m)	(ft)	(m)	(ft)	(L)	(Gal)	(mm)	(in)	(L)	(ft^3)	(kg)	(lb)
EF4 / EFO4	1.2	4	1.52	5.0	265	70	203	8	1190	42	1904	5250
EF5 / EFO5	1.5	5	1.62	5.3	420	111	305	10	2124	75	2612	5758
EF6 / EFO6	1.8	6	1.93	6.3	610	160	305	12	3470	123	5552	15375
EF8 / EFO8	2.4	8	2.59	8.5	1070	280	610	24	8780	310	14048	38750
EF10 / EFO10	3.0	10	3.25	10.7	1670	440	610	24	17790	628	28464	78500
EF12 / EFO12	3.6	12	3.89	12.8	2475	655	610	24	31220	1103	49952	137875

*Increased sump depth may be added to increase sediment storage capacity

** Average density of wet packed sediment in sump = 1.6 kg/L (100 lb/ft^3)

Feature	Benefit	Feature Appeals To
Patent-pending enhanced flow treatment and scour prevention technology	Superior, verified third-party performance	Regulator, Specifying & Design Engineer
Third-party verified light liquid capture and retention for EFO version	Proven performance for fuel/oil hotspot locations	Regulator, Specifying & Design Engineer, Site Owner
Functions as bend, junction or inlet structure	Design flexibility	Specifying & Design Engineer
Minimal drop between inlet and outlet	Site installation ease	Contractor
Large diameter outlet riser for inspection and maintenance	Easy maintenance access from grade	Maintenance Contractor & Site Owner

STANDARD STORMCEPTOR EF/EFO DRAWINGS

For standard details, please visit http://www.imbriumsystems.com/stormwater-treatment-solutions/stormceptor-ef

STANDARD STORMCEPTOR EF/EFO SPECIFICATION

For specifications, please visit http://www.imbriumsystems.com/stormwater-treatment-solutions/stormceptor-ef

STANDARD PERFORMANCE SPECIFICATION FOR "OIL GRIT SEPARATOR" (OGS) STORMWATER QUALITY TREAMENT DEVICE

PART 1 – GENERAL

1.1 WORK INCLUDED

This section specifies requirements for selecting, sizing, and designing an underground Oil Grit Separator (OGS) device for stormwater quality treatment, with third-party testing results and a Statement of Verification in accordance with ISO 14034 Environmental Management – Environmental Technology Verification (ETV).

1.2 REFERENCE STANDARDS & PROCEDURES

ISO 14034:2016 Environmental management – Environmental technology verification (ETV)

Canadian Environmental Technology Verification (ETV) Program's **Procedure for Laboratory Testing of Oil-Grit Separators.**

1.3 SUBMITTALS

1.3.1 All submittals, including sizing reports & shop drawings, shall be submitted upon request with each order to the contractor then forwarded to the Engineer of Record for review and acceptance. Shop drawings shall detail all OGS components, elevations, and sequence of construction.

1.3.2 Alternative devices shall have features identical to or greater than the specified device, including: treatment chamber diameter, treatment chamber wet volume, sediment storage volume, and oil storage volume.

1.3.3 Unless directed otherwise by the Engineer of Record, OGS stormwater quality treatment product substitutions or alternatives submitted within ten days prior to project bid shall not be accepted. All alternatives or substitutions submitted shall be signed and sealed by a local registered Professional Engineer, based on the exact same criteria detailed in Section 3, in entirety, subject to review and approval by the Engineer of Record.

PART 2 – PRODUCTS

2.1 OGS POLLUTANT STORAGE

The OGS device shall include a sump for sediment storage, and a protected volume for the capture and storage of petroleum hydrocarbons and buoyant gross pollutants. The **minimum** sediment & petroleum hydrocarbon storage capacity shall be as follows:

2.1.1	4 ft (1219 mm) Diameter OGS Units:	1.19 m^3 sediment / 265 L oil
	5 ft (1524 mm) Diameter OGS Units:	1.95 m^3 sediment / 420L oil
	6 ft (1829 mm) Diameter OGS Units:	3.48 m^3 sediment / 609 L oil
	8 ft (2438 mm) Diameter OGS Units:	8.78 m^3 sediment / 1,071 L oil
	10 ft (3048 mm) Diameter OGS Units:	17.78 m^3 sediment / 1,673 L oil
	12 ft (3657 mm) Diameter OGS Units:	31.23 m^3 sediment / 2,476 L oil

PART 3 – PERFORMANCE & DESIGN

3.1 GENERAL

The OGS stormwater quality treatment device shall be verified in accordance with ISO 14034:2016 Environmental management – Environmental technology verification (ETV). The OGS stormwater quality treatment device shall remove oil, sediment and gross pollutants from stormwater runoff during frequent wet weather events, and retain these pollutants during less frequent high flow wet weather events below the insert within the OGS for later removal during maintenance. The Manufacturer shall have at least ten (10) years of local experience, history and success in engineering design, manufacturing and production and supply of OGS stormwater quality treatment device systems, acceptable to the Engineer of Record.

3.2 SIZING METHODOLOGY

The OGS device shall be engineered, designed and sized to provide stormwater quality treatment based on treating a minimum of 90 percent of the average annual runoff volume and a minimum removal of an annual average 60% of the sediment (TSS) load based on the Particle Size Distribution (PSD) specified in the sizing report for the specified device. Sizing of the OGS shall be determined by use of a minimum ten (10) years of local historical rainfall data provided by Environment Canada. Sizing shall also be determined by use of the sediment removal performance data derived from the ISO 14034 ETV third-party verified laboratory testing data from testing conducted in accordance with the Canadian ETV protocol Procedure for Laboratory Testing of Oil-Grit Separators, as follows:

3.2.1 Sediment removal efficiency for a given surface loading rate and its associated flow rate shall be based on sediment removal efficiency demonstrated at the seven (7) tested surface loading rates specified in the protocol, ranging 40 L/min/m^2 to 1400 L/min/m^2, and as stated in the ISO 14034 ETV Verification Statement for the OGS device.

3.2.2 Sediment removal efficiency for surface loading rates between 40 L/min/m^2 and 1400 L/min/m^2 shall be based on linear interpolation of data between consecutive tested surface loading rates.

3.2.3 Sediment removal efficiency for surface loading rates less than the lowest tested surface loading rate of 40 L/min/m^2 shall be assumed to be identical to the sediment removal efficiency at 40 L/min/m^2. No extrapolation shall be allowed that results in a sediment removal efficiency that is greater than that demonstrated at 40 L/min/m^2.

3.2.4 Sediment removal efficiency for surface loading rates greater than the highest tested surface loading rate of 1400 L/min/m^2 shall assume zero sediment removal for the portion of flow that exceeds 1400 L/min/m^2, and shall be calculated using a simple proportioning formula, with 1400 L/min/m^2 in the numerator and the higher surface loading rate in the denominator, and multiplying the resulting fraction times the sediment removal efficiency at 1400 L/min/m^2.

The OGS device shall also have sufficient annual sediment storage capacity as specified and calculated in Section 2.1.

3.3 CANADIAN ETV or ISO 14034 ETV VERIFICATION OF SCOUR TESTING

The OGS device shall have Canadian ETV or ISO 14034 ETV Verification of third-party scour testing conducted in accordance with the Canadian ETV Program's **Procedure for Laboratory Testing of Oil-Grit Separators.**

3.3.1 To be acceptable for on-line installation, the OGS device must demonstrate an average scour test effluent concentration less than 10 mg/L at each surface loading rate tested, up to and including 2600 L/min/m^2.

APPENDIX 2

VISUAL OTTHYMO SCHEMATICS & OUTPUT FILES

1 **Area Draining to North Creek**
AREA [ha] - 16.925

2 **Area Draining to South Creek**
AREA [ha] - 13.868

5868 COUNTY ROAD 65, PORT HOPE, ON
VISUAL OTTHYMO SCHEME
PRE-DEVELOPMENT FLOWS

D.G. BIDDLE & ASSOCIATES
CONSULTING ENGINEERS & PLANNERS
96 King Street East
Oshawa, Ontario, L1H 1B6
Phone: 905-576-8500
info@dgbiddle.com
dgbiddle.com

SCALE	N.T.S.
DRAWN	M.J.H.
DESIGN	M.J.H.
CHECKED	D.D.M.
DATE	JAN 2023

PROJECT 122049

DWG FIG 10

```
*********************************
** SIMULATION:1) 2-Year        **
*********************************
--------------------
| CHICAGO STORM    |    IDF curve parameters: A=1778.000
| Ptotal= 28.11 mm |                          B=  13.000
--------------------                          C=   1.000
                       used in:   INTENSITY =  A / (t + B)^C

                       Duration of storm  =  4.00 hrs
                       Storm time step    = 10.00 min
                       Time to peak ratio =  0.33

                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.00    0.49 |  1.00   18.95 |  2.00    2.84 |  3.00    0.71
                0.17    0.66 |  1.17   77.30 |  2.17    2.09 |  3.17    0.61
                0.33    0.93 |  1.33   26.45 |  2.33    1.60 |  3.33    0.52
                0.50    1.43 |  1.50   11.48 |  2.50    1.26 |  3.50    0.46
                0.67    2.46 |  1.67    6.42 |  2.67    1.02 |  3.67    0.40
                0.83    5.25 |  1.83    4.10 |  2.83    0.85 |  3.83    0.35


--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0002)|   Area    (ha)=  13.87   Curve Number    (CN)= 71.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.57

        NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                            ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    0.49 | 1.083   18.95 | 2.083    2.84 |  3.08    0.71
               0.167    0.49 | 1.167   18.95 | 2.167    2.84 |  3.17    0.71
               0.250    0.66 | 1.250   77.30 | 2.250    2.09 |  3.25    0.61
               0.333    0.66 | 1.333   77.30 | 2.333    2.09 |  3.33    0.61
               0.417    0.93 | 1.417   26.45 | 2.417    1.60 |  3.42    0.52
               0.500    0.93 | 1.500   26.45 | 2.500    1.60 |  3.50    0.52
               0.583    1.43 | 1.583   11.48 | 2.583    1.26 |  3.58    0.46
               0.667    1.43 | 1.667   11.48 | 2.667    1.26 |  3.67    0.46
               0.750    2.46 | 1.750    6.42 | 2.750    1.02 |  3.75    0.40
               0.833    2.46 | 1.833    6.42 | 2.833    1.02 |  3.83    0.40
               0.917    5.25 | 1.917    4.10 | 2.917    0.85 |  3.92    0.35
               1.000    5.25 | 2.000    4.10 | 3.000    0.85 |  4.00    0.35

     Unit Hyd Qpeak  (cms)=   0.936

     PEAK FLOW       (cms)=   0.114 (i)
     TIME TO PEAK    (hrs)=   2.000
     RUNOFF VOLUME    (mm)=   4.208
     TOTAL RAINFALL   (mm)=  28.106
     RUNOFF COEFFICIENT   =   0.150

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0001)|   Area    (ha)=  16.92   Curve Number    (CN)= 71.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.64

        NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                            ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    0.49 | 1.083   18.95 | 2.083    2.84 |  3.08    0.71
               0.167    0.49 | 1.167   18.95 | 2.167    2.84 |  3.17    0.71
               0.250    0.66 | 1.250   77.30 | 2.250    2.09 |  3.25    0.61
               0.333    0.66 | 1.333   77.30 | 2.333    2.09 |  3.33    0.61
               0.417    0.93 | 1.417   26.45 | 2.417    1.60 |  3.42    0.52
               0.500    0.93 | 1.500   26.45 | 2.500    1.60 |  3.50    0.52
               0.583    1.43 | 1.583   11.48 | 2.583    1.26 |  3.58    0.46
               0.667    1.43 | 1.667   11.48 | 2.667    1.26 |  3.67    0.46
               0.750    2.46 | 1.750    6.42 | 2.750    1.02 |  3.75    0.40
               0.833    2.46 | 1.833    6.42 | 2.833    1.02 |  3.83    0.40
               0.917    5.25 | 1.917    4.10 | 2.917    0.85 |  3.92    0.35
               1.000    5.25 | 2.000    4.10 | 3.000    0.85 |  4.00    0.35

     Unit Hyd Qpeak  (cms)=   1.011

     PEAK FLOW       (cms)=   0.127 (i)
     TIME TO PEAK    (hrs)=   2.083
     RUNOFF VOLUME    (mm)=   4.209
     TOTAL RAINFALL   (mm)=  28.106
     RUNOFF COEFFICIENT   =   0.150

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
*********************************
** SIMULATION:2) 5-Year        **
*********************************
--------------------
| CHICAGO STORM    |    IDF curve parameters: A=2464.000
| Ptotal= 38.49 mm |                          B=  16.000
--------------------                          C=   1.000
                       used in:   INTENSITY =  A / (t + B)^C

                       Duration of storm  =  4.00 hrs
                       Storm time step    = 10.00 min
                       Time to peak ratio =  0.33

                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.00    0.81 |  1.00   27.06 |  2.00    4.54 |  3.00    1.17
                0.17    1.09 |  1.17   94.77 |  2.17    3.37 |  3.17    1.00
                0.33    1.53 |  1.33   36.99 |  2.33    2.60 |  3.33    0.87
                0.50    2.32 |  1.50   17.18 |  2.50    2.06 |  3.50    0.76
                0.67    3.95 |  1.67    9.92 |  2.67    1.68 |  3.67    0.67
                0.83    8.18 |  1.83    6.46 |  2.83    1.39 |  3.83    0.59


--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0002)|   Area    (ha)=  13.87   Curve Number    (CN)= 71.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.57

        NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                            ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    0.81 | 1.083   27.06 | 2.083    4.54 |  3.08    1.17
               0.167    0.81 | 1.167   27.06 | 2.167    4.54 |  3.17    1.17
               0.250    1.09 | 1.250   94.77 | 2.250    3.37 |  3.25    1.00
               0.333    1.09 | 1.333   94.77 | 2.333    3.37 |  3.33    1.00
               0.417    1.53 | 1.417   36.99 | 2.417    2.60 |  3.42    0.87
               0.500    1.53 | 1.500   36.99 | 2.500    2.60 |  3.50    0.87
               0.583    2.32 | 1.583   17.18 | 2.583    2.06 |  3.58    0.76
               0.667    2.32 | 1.667   17.18 | 2.667    2.06 |  3.67    0.76
               0.750    3.95 | 1.750    9.92 | 2.750    1.68 |  3.75    0.67
               0.833    3.95 | 1.833    9.92 | 2.833    1.68 |  3.83    0.67
               0.917    8.18 | 1.917    6.46 | 2.917    1.39 |  3.92    0.59
               1.000    8.18 | 2.000    6.46 | 3.000    1.39 |  4.00    0.59

     Unit Hyd Qpeak  (cms)=   0.936

     PEAK FLOW       (cms)=   0.215 (i)
     TIME TO PEAK    (hrs)=   2.000
     RUNOFF VOLUME    (mm)=   8.173
     TOTAL RAINFALL   (mm)=  38.492
     RUNOFF COEFFICIENT   =   0.212

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0001)|   Area    (ha)=  16.92   Curve Number    (CN)= 71.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.64

        NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                            ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
```

0.083	0.81	1.083	27.06	2.083	4.54	3.08	1.17
0.167	0.81	1.167	27.06	2.167	4.54	3.17	1.17
0.250	1.09	1.250	94.77	2.250	3.37	3.25	1.00
0.333	1.09	1.333	94.77	2.333	3.37	3.33	1.00
0.417	1.53	1.417	36.99	2.417	2.60	3.42	0.87
0.500	1.53	1.500	36.99	2.500	2.60	3.50	0.87
0.583	2.32	1.583	17.18	2.583	2.06	3.58	0.76
0.667	2.32	1.667	17.18	2.667	2.06	3.67	0.76
0.750	3.95	1.750	9.92	2.750	1.68	3.75	0.67
0.833	3.95	1.833	9.92	2.833	1.68	3.83	0.67
0.917	8.18	1.917	6.46	2.917	1.39	3.92	0.59
1.000	8.18	2.000	6.46	3.000	1.39	4.00	0.59

Unit Hyd Qpeak (cms)= 1.011

PEAK FLOW (cms)= 0.241 (i)
TIME TO PEAK (hrs)= 2.083
RUNOFF VOLUME (mm)= 8.173
TOTAL RAINFALL (mm)= 38.492
RUNOFF COEFFICIENT = 0.212

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

****
** SIMULATION:3) 10-Year **
****

CHICAGO STORM
Ptotal= 44.04 mm

IDF curve parameters: A=2819.000
B= 16.000
C= 1.000
used in: INTENSITY = A / (t + B)^C

Duration of storm = 4.00 hrs
Storm time step = 10.00 min
Time to peak ratio = 0.33

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.00	0.93	1.00	30.96	2.00	5.20	3.00	1.34
0.17	1.24	1.17	108.42	2.17	3.85	3.17	1.15
0.33	1.75	1.33	42.32	2.33	2.97	3.33	0.99
0.50	2.66	1.50	19.65	2.50	2.36	3.50	0.87
0.67	4.51	1.67	11.35	2.67	1.92	3.67	0.76
0.83	9.35	1.83	7.39	2.83	1.59	3.83	0.68

CALIB
NASHYD (0002)
ID= 1 DT= 5.0 min

Area (ha)= 13.87 Curve Number (CN)= 71.0
Ia (mm)= 5.00 # of Linear Res.(N)= 3.00
U.H. Tp(hrs)= 0.57

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.93	1.083	30.96	2.083	5.20	3.08	1.34
0.167	0.93	1.167	30.96	2.167	5.20	3.17	1.34
0.250	1.24	1.250	108.42	2.250	3.85	3.25	1.15
0.333	1.24	1.333	108.42	2.333	3.85	3.33	1.15
0.417	1.75	1.417	42.32	2.417	2.97	3.42	0.99
0.500	1.75	1.500	42.32	2.500	2.97	3.50	0.99
0.583	2.66	1.583	19.65	2.583	2.36	3.58	0.87
0.667	2.66	1.667	19.65	2.667	2.36	3.67	0.87
0.750	4.51	1.750	11.35	2.750	1.92	3.75	0.76
0.833	4.51	1.833	11.35	2.833	1.92	3.83	0.76
0.917	9.35	1.917	7.39	2.917	1.59	3.92	0.68
1.000	9.35	2.000	7.39	3.000	1.59	4.00	0.68

Unit Hyd Qpeak (cms)= 0.936

PEAK FLOW (cms)= 0.283 (i)
TIME TO PEAK (hrs)= 2.000
RUNOFF VOLUME (mm)= 10.673
TOTAL RAINFALL (mm)= 44.038
RUNOFF COEFFICIENT = 0.242

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB
NASHYD (0001)
ID= 1 DT= 5.0 min

Area (ha)= 16.92 Curve Number (CN)= 71.0
Ia (mm)= 5.00 # of Linear Res.(N)= 3.00
U.H. Tp(hrs)= 0.64

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.93	1.083	30.96	2.083	5.20	3.08	1.34
0.167	0.93	1.167	30.96	2.167	5.20	3.17	1.34
0.250	1.24	1.250	108.42	2.250	3.85	3.25	1.15
0.333	1.24	1.333	108.42	2.333	3.85	3.33	1.15
0.417	1.75	1.417	42.32	2.417	2.97	3.42	0.99
0.500	1.75	1.500	42.32	2.500	2.97	3.50	0.99
0.583	2.66	1.583	19.65	2.583	2.36	3.58	0.87
0.667	2.66	1.667	19.65	2.667	2.36	3.67	0.87
0.750	4.51	1.750	11.35	2.750	1.92	3.75	0.76
0.833	4.51	1.833	11.35	2.833	1.92	3.83	0.76
0.917	9.35	1.917	7.39	2.917	1.59	3.92	0.68
1.000	9.35	2.000	7.39	3.000	1.59	4.00	0.68

Unit Hyd Qpeak (cms)= 1.011

PEAK FLOW (cms)= 0.316 (i)
TIME TO PEAK (hrs)= 2.083
RUNOFF VOLUME (mm)= 10.673
TOTAL RAINFALL (mm)= 44.038
RUNOFF COEFFICIENT = 0.242

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

****
** SIMULATION:4) 25-Year **
****

CHICAGO STORM
Ptotal= 60.23 mm

IDF curve parameters: A=3886.000
B= 18.000
C= 1.000
used in: INTENSITY = A / (t + B)^C

Duration of storm = 4.00 hrs
Storm time step = 10.00 min
Time to peak ratio = 0.33

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.00	1.41	1.00	43.05	2.00	7.72	3.00	2.04
0.17	1.89	1.17	138.79	2.17	5.76	3.17	1.74
0.33	2.65	1.33	58.11	2.33	4.46	3.33	1.51
0.50	4.00	1.50	28.06	2.50	3.56	3.50	1.32
0.67	6.73	1.67	16.53	2.67	2.90	3.67	1.16
0.83	13.69	1.83	10.90	2.83	2.41	3.83	1.03

CALIB
NASHYD (0002)
ID= 1 DT= 5.0 min

Area (ha)= 13.87 Curve Number (CN)= 71.0
Ia (mm)= 5.00 # of Linear Res.(N)= 3.00
U.H. Tp(hrs)= 0.57

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	1.41	1.083	43.05	2.083	7.72	3.08	2.04
0.167	1.41	1.167	43.05	2.167	7.72	3.17	2.04
0.250	1.89	1.250	138.79	2.250	5.76	3.25	1.74
0.333	1.89	1.333	138.79	2.333	5.76	3.33	1.74
0.417	2.65	1.417	58.11	2.417	4.46	3.42	1.51
0.500	2.65	1.500	58.11	2.500	4.46	3.50	1.51
0.583	4.00	1.583	28.06	2.583	3.56	3.58	1.32
0.667	4.00	1.667	28.06	2.667	3.56	3.67	1.32
0.750	6.73	1.750	16.53	2.750	2.90	3.75	1.16
0.833	6.73	1.833	16.53	2.833	2.90	3.83	1.16
0.917	13.69	1.917	10.90	2.917	2.41	3.92	1.03
1.000	13.69	2.000	10.90	3.000	2.41	4.00	1.03

Unit Hyd Qpeak (cms)= 0.936

PEAK FLOW (cms)= 0.504 (i)
TIME TO PEAK (hrs)= 2.000
RUNOFF VOLUME (mm)= 19.189
TOTAL RAINFALL (mm)= 60.234
RUNOFF COEFFICIENT = 0.319

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB	
NASHYD (0001)	Area (ha)= 16.92 Curve Number (CN)= 71.0
ID= 1 DT= 5.0 min	Ia (mm)= 5.00 # of Linear Res.(N)= 3.00
	U.H. Tp(hrs)= 0.64

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	1.41	1.083	43.05	2.083	7.72	3.08	2.04
0.167	1.41	1.167	43.05	2.167	7.72	3.17	2.04
0.250	1.89	1.250	138.79	2.250	5.76	3.25	1.74
0.333	1.89	1.333	138.79	2.333	5.76	3.33	1.74
0.417	2.65	1.417	58.11	2.417	4.46	3.42	1.51
0.500	2.65	1.500	58.11	2.500	4.46	3.50	1.51
0.583	4.00	1.583	28.06	2.583	3.56	3.58	1.32
0.667	4.00	1.667	28.06	2.667	3.56	3.67	1.32
0.750	6.73	1.750	16.53	2.750	2.90	3.75	1.16
0.833	6.73	1.833	16.53	2.833	2.90	3.83	1.16
0.917	13.69	1.917	10.90	2.917	2.41	3.92	1.03
1.000	13.69	2.000	10.90	3.000	2.41	4.00	1.03

Unit Hyd Qpeak (cms)= 1.011

PEAK FLOW (cms)= 0.563 (i)
TIME TO PEAK (hrs)= 2.083
RUNOFF VOLUME (mm)= 19.189
TOTAL RAINFALL (mm)= 60.234
RUNOFF COEFFICIENT = 0.319

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

****
** SIMULATION:5) 50-Year **
****

CHICAGO STORM	
Ptotal= 71.95 mm	IDF curve parameters: A=4750.000
	B= 24.000
	C= 1.000

used in: INTENSITY = A / (t + B)^C

Duration of storm = 4.00 hrs
Storm time step = 10.00 min
Time to peak ratio = 0.33

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.00	2.18	1.00	52.37	2.00	11.13	3.00	3.12
0.17	2.89	1.17	139.71	2.17	8.44	3.17	2.68
0.33	4.02	1.33	68.44	2.33	6.62	3.33	2.33
0.50	5.96	1.50	36.37	2.50	5.33	3.50	2.04
0.67	9.77	1.67	22.56	2.67	4.38	3.67	1.81
0.83	18.93	1.83	15.36	2.83	3.67	3.83	1.61

CALIB	
NASHYD (0002)	Area (ha)= 13.87 Curve Number (CN)= 71.0
ID= 1 DT= 5.0 min	Ia (mm)= 5.00 # of Linear Res.(N)= 3.00
	U.H. Tp(hrs)= 0.57

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	2.18	1.083	52.37	2.083	11.13	3.08	3.12
0.167	2.18	1.167	52.37	2.167	11.13	3.17	3.12
0.250	2.89	1.250	139.71	2.250	8.44	3.25	2.68
0.333	2.89	1.333	139.71	2.333	8.44	3.33	2.68
0.417	4.02	1.417	68.44	2.417	6.62	3.42	2.33
0.500	4.02	1.500	68.44	2.500	6.62	3.50	2.33
0.583	5.96	1.583	36.37	2.583	5.33	3.58	2.04
0.667	5.96	1.667	36.37	2.667	5.33	3.67	2.04
0.750	9.77	1.750	22.56	2.750	4.38	3.75	1.81
0.833	9.77	1.833	22.56	2.833	4.38	3.83	1.81
0.917	18.93	1.917	15.36	2.917	3.67	3.92	1.61
1.000	18.93	2.000	15.36	3.000	3.67	4.00	1.61

Unit Hyd Qpeak (cms)= 0.936

PEAK FLOW (cms)= 0.652 (i)
TIME TO PEAK (hrs)= 2.083
RUNOFF VOLUME (mm)= 26.257
TOTAL RAINFALL (mm)= 71.949
RUNOFF COEFFICIENT = 0.365

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB	
NASHYD (0001)	Area (ha)= 16.92 Curve Number (CN)= 71.0
ID= 1 DT= 5.0 min	Ia (mm)= 5.00 # of Linear Res.(N)= 3.00
	U.H. Tp(hrs)= 0.64

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	2.18	1.083	52.37	2.083	11.13	3.08	3.12
0.167	2.18	1.167	52.37	2.167	11.13	3.17	3.12
0.250	2.89	1.250	139.71	2.250	8.44	3.25	2.68
0.333	2.89	1.333	139.71	2.333	8.44	3.33	2.68
0.417	4.02	1.417	68.44	2.417	6.62	3.42	2.33
0.500	4.02	1.500	68.44	2.500	6.62	3.50	2.33
0.583	5.96	1.583	36.37	2.583	5.33	3.58	2.04
0.667	5.96	1.667	36.37	2.667	5.33	3.67	2.04
0.750	9.77	1.750	22.56	2.750	4.38	3.75	1.81
0.833	9.77	1.833	22.56	2.833	4.38	3.83	1.81
0.917	18.93	1.917	15.36	2.917	3.67	3.92	1.61
1.000	18.93	2.000	15.36	3.000	3.67	4.00	1.61

Unit Hyd Qpeak (cms)= 1.011

PEAK FLOW (cms)= 0.733 (i)
TIME TO PEAK (hrs)= 2.167
RUNOFF VOLUME (mm)= 26.257
TOTAL RAINFALL (mm)= 71.949
RUNOFF COEFFICIENT = 0.365

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

****
** SIMULATION:6) 100-Year **
****

CHICAGO STORM	
Ptotal= 83.38 mm	IDF curve parameters: A=5588.000
	B= 28.000
	C= 1.000

used in: INTENSITY = A / (t + B)^C

Duration of storm = 4.00 hrs
Storm time step = 10.00 min
Time to peak ratio = 0.33

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.00	2.89	1.00	60.52	2.00	14.14	3.00	4.10
0.17	3.81	1.17	147.05	2.17	10.82	3.17	3.54
0.33	5.26	1.33	77.70	2.33	8.55	3.33	3.08
0.50	7.73	1.50	43.43	2.50	6.93	3.50	2.71
0.67	12.46	1.67	27.74	2.67	5.73	3.67	2.40
0.83	23.45	1.83	19.25	2.83	4.81	3.83	2.14

```
--------------------
| CALIB            |
| NASHYD   (  0002)|   Area    (ha)=  13.87   Curve Number   (CN)= 71.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.57

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                            ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    2.89 | 1.083   60.52 | 2.083   14.14 |  3.08    4.10
               0.167    2.89 | 1.167   60.52 | 2.167   14.14 |  3.17    4.10
               0.250    3.81 | 1.250  147.05 | 2.250   10.82 |  3.25    3.54
               0.333    3.81 | 1.333  147.05 | 2.333   10.82 |  3.33    3.54
               0.417    5.26 | 1.417   77.70 | 2.417    8.55 |  3.42    3.08
               0.500    5.26 | 1.500   77.70 | 2.500    8.55 |  3.50    3.08
               0.583    7.73 | 1.583   43.43 | 2.583    6.93 |  3.58    2.71
               0.667    7.73 | 1.667   43.43 | 2.667    6.93 |  3.67    2.71
               0.750   12.46 | 1.750   27.74 | 2.750    5.73 |  3.75    2.40
               0.833   12.46 | 1.833   27.74 | 2.833    5.73 |  3.83    2.40
               0.917   23.45 | 1.917   19.25 | 2.917    4.81 |  3.92    2.14
               1.000   23.45 | 2.000   19.25 | 3.000    4.81 |  4.00    2.14

     Unit Hyd Qpeak  (cms)=   0.936

     PEAK FLOW       (cms)=   0.814 (i)
     TIME TO PEAK    (hrs)=   2.083
     RUNOFF VOLUME    (mm)=  33.727
     TOTAL RAINFALL   (mm)=  83.375
     RUNOFF COEFFICIENT   =   0.405

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0001)|   Area    (ha)=  16.92   Curve Number   (CN)= 71.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.64

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.

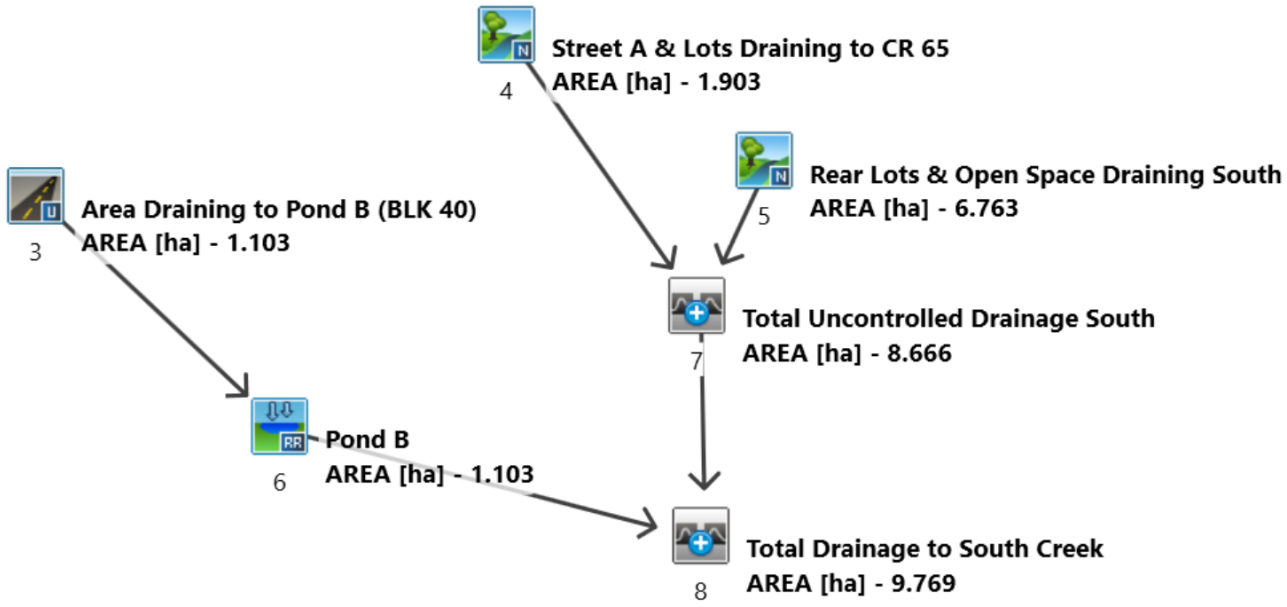

                            ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    2.89 | 1.083   60.52 | 2.083   14.14 |  3.08    4.10
               0.167    2.89 | 1.167   60.52 | 2.167   14.14 |  3.17    4.10
               0.250    3.81 | 1.250  147.05 | 2.250   10.82 |  3.25    3.54
               0.333    3.81 | 1.333  147.05 | 2.333   10.82 |  3.33    3.54
               0.417    5.26 | 1.417   77.70 | 2.417    8.55 |  3.42    3.08
               0.500    5.26 | 1.500   77.70 | 2.500    8.55 |  3.50    3.08
               0.583    7.73 | 1.583   43.43 | 2.583    6.93 |  3.58    2.71
               0.667    7.73 | 1.667   43.43 | 2.667    6.93 |  3.67    2.71
               0.750   12.46 | 1.750   27.74 | 2.750    5.73 |  3.75    2.40
               0.833   12.46 | 1.833   27.74 | 2.833    5.73 |  3.83    2.40
               0.917   23.45 | 1.917   19.25 | 2.917    4.81 |  3.92    2.14
               1.000   23.45 | 2.000   19.25 | 3.000    4.81 |  4.00    2.14

     Unit Hyd Qpeak  (cms)=   1.011

     PEAK FLOW       (cms)=   0.918 (i)
     TIME TO PEAK    (hrs)=   2.167
     RUNOFF VOLUME    (mm)=  33.728
     TOTAL RAINFALL   (mm)=  83.375
     RUNOFF COEFFICIENT   =   0.405

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
```



5868 COUNTY ROAD 65, PORT HOPE, ON
VISUAL OTTHYMO SCHEME POST-DEVELOPMENT FLOWS TO SOUTHERN CREEK

D.G. BIDDLE & ASSOCIATES
CONSULTING ENGINEERS & PLANNERS
96 King Street East
Oshawa, Ontario, L1H 1B6
Phone: 905-576-8500
info@dgbiddle.com
dgbiddle.com

SCALE	N.T.S.
DRAWN	M.J.H.
DESIGN	M.J.H.
CHECKED	D.D.M.
DATE	JAN 2023

PROJECT 122049

DWG FIG 11

```
**********************************
** SIMULATION:1) 2-Year         **
**********************************
--------------------
| CHICAGO STORM    |    IDF curve parameters: A=1778.000
| Ptotal= 28.11 mm |                          B=  13.000
--------------------                          C=   1.000
                       used in:   INTENSITY =  A / (t + B)^C

                       Duration of storm  =  4.00 hrs
                       Storm time step    = 10.00 min
                       Time to peak ratio =  0.33
```

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.00	0.49	1.00	18.95	2.00	2.84	3.00	0.71
0.17	0.66	1.17	77.30	2.17	2.09	3.17	0.61
0.33	0.93	1.33	26.45	2.33	1.60	3.33	0.52
0.50	1.43	1.50	11.48	2.50	1.26	3.50	0.46
0.67	2.46	1.67	6.42	2.67	1.02	3.67	0.40
0.83	5.25	1.83	4.10	2.83	0.85	3.83	0.35

```
--------------------
| CALIB            |
| NASHYD  (  0005) |   Area    (ha)=   6.76   Curve Number   (CN)= 71.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.24

        NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.
```

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.49	1.083	18.95	2.083	2.84	3.08	0.71
0.167	0.49	1.167	18.95	2.167	2.84	3.17	0.71
0.250	0.66	1.250	77.30	2.250	2.09	3.25	0.61
0.333	0.66	1.333	77.30	2.333	2.09	3.33	0.61
0.417	0.93	1.417	26.45	2.417	1.60	3.42	0.52
0.500	0.93	1.500	26.45	2.500	1.60	3.50	0.52
0.583	1.43	1.583	11.48	2.583	1.26	3.58	0.46
0.667	1.43	1.667	11.48	2.667	1.26	3.67	0.46
0.750	2.46	1.750	6.42	2.750	1.02	3.75	0.40
0.833	2.46	1.833	6.42	2.833	1.02	3.83	0.40
0.917	5.25	1.917	4.10	2.917	0.85	3.92	0.35
1.000	5.25	2.000	4.10	3.000	0.85	4.00	0.35

```
     Unit Hyd Qpeak  (cms)=   1.067

     PEAK FLOW       (cms)=   0.097 (i)
     TIME TO PEAK    (hrs)=   1.583
     RUNOFF VOLUME    (mm)=   4.205
     TOTAL RAINFALL   (mm)=  28.106
     RUNOFF COEFFICIENT   =   0.150

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------
| CALIB            |
| NASHYD  (  0004) |   Area    (ha)=   1.90   Curve Number   (CN)= 71.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.05

        NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.
```

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.49	1.083	18.95	2.083	2.84	3.08	0.71
0.167	0.49	1.167	18.95	2.167	2.84	3.17	0.71
0.250	0.66	1.250	77.30	2.250	2.09	3.25	0.61
0.333	0.66	1.333	77.30	2.333	2.09	3.33	0.61
0.417	0.93	1.417	26.45	2.417	1.60	3.42	0.52
0.500	0.93	1.500	26.45	2.500	1.60	3.50	0.52
0.583	1.43	1.583	11.48	2.583	1.26	3.58	0.46
0.667	1.43	1.667	11.48	2.667	1.26	3.67	0.46
0.750	2.46	1.750	6.42	2.750	1.02	3.75	0.40
0.833	2.46	1.833	6.42	2.833	1.02	3.83	0.40
0.917	5.25	1.917	4.10	2.917	0.85	3.92	0.35
1.000	5.25	2.000	4.10	3.000	0.85	4.00	0.35

```
     Unit Hyd Qpeak  (cms)=   1.483

     PEAK FLOW       (cms)=   0.046 (i)
     TIME TO PEAK    (hrs)=   1.333
     RUNOFF VOLUME    (mm)=   3.157
     TOTAL RAINFALL   (mm)=  28.106
     RUNOFF COEFFICIENT   =   0.112

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------
| ADD HYD  (  0007)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0004):      1.90   0.046     1.33     3.16
     + ID2= 2 (  0005):      6.76   0.097     1.58     4.20
       ================================================
       ID = 3 (  0007):      8.67   0.113     1.50     3.97

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------
| CALIB            |
| STANDHYD (  0003)|   Area    (ha)=   1.10
|ID= 1 DT= 5.0 min |   Total Imp(%)=  38.73   Dir. Conn.(%)=  38.73
--------------------
                                IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=         0.43          0.68
     Dep. Storage     (mm)=         1.00          1.50
     Average Slope     (%)=         1.00          2.00
     Length            (m)=        85.76         40.00
     Mannings n            =        0.013         0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.
```

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.49	1.083	18.95	2.083	2.84	3.08	0.71
0.167	0.49	1.167	18.95	2.167	2.84	3.17	0.71
0.250	0.66	1.250	77.30	2.250	2.09	3.25	0.61
0.333	0.66	1.333	77.30	2.333	2.09	3.33	0.61
0.417	0.93	1.417	26.45	2.417	1.60	3.42	0.52
0.500	0.93	1.500	26.45	2.500	1.60	3.50	0.52
0.583	1.43	1.583	11.48	2.583	1.26	3.58	0.46
0.667	1.43	1.667	11.48	2.667	1.26	3.67	0.46
0.750	2.46	1.750	6.42	2.750	1.02	3.75	0.40
0.833	2.46	1.833	6.42	2.833	1.02	3.83	0.40
0.917	5.25	1.917	4.10	2.917	0.85	3.92	0.35
1.000	5.25	2.000	4.10	3.000	0.85	4.00	0.35

```
     Max.Eff.Inten.(mm/hr)=      77.30        10.09
               over (min)         5.00        25.00
     Storage Coeff.  (min)=       2.58 (ii)   20.25 (ii)
     Unit Hyd. Tpeak (min)=       5.00        25.00
     Unit Hyd. peak  (cms)=       0.29         0.05
                                                      *TOTALS*
     PEAK FLOW       (cms)=       0.09         0.01       0.093 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.67        1.33
     RUNOFF VOLUME    (mm)=      27.11         5.43       13.81
     TOTAL RAINFALL   (mm)=      28.11        28.11       28.11
     RUNOFF COEFFICIENT   =       0.96         0.19        0.49

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------
| RESERVOIR(  0006)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000      0.0000   |    0.0128      0.0500
                          0.0068      0.0100   |    0.0149      0.0700
                          0.0102      0.0300   |    0.0168      0.0991
```

```
                              AREA      QPEAK     TPEAK       R.V.
                              (ha)      (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0003)      1.103     0.093      1.33      13.81
   OUTFLOW: ID= 1 (  0006)      1.103     0.007      2.33      13.48

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=  7.57
                  TIME SHIFT OF PEAK FLOW         (min)= 60.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.0112

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0008)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0006):      1.10   0.007     2.33    13.48
     + ID2= 2 (  0007):      8.67   0.113     1.50     3.97
       ==========================================================
       ID = 3 (  0008):      9.77   0.119     1.50     5.05

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
*********************************
** SIMULATION:2) 5-Year       **
*********************************
--------------------
| CHICAGO STORM    |    IDF curve parameters: A=2464.000
| Ptotal= 38.49 mm |                          B=  16.000
--------------------                          C=   1.000
                         used in:   INTENSITY =  A / (t + B)^C

                         Duration of storm  =  4.00 hrs
                         Storm time step    = 10.00 min
                         Time to peak ratio =  0.33

               TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.00    0.81 |  1.00   27.06 |  2.00    4.54 |  3.00    1.17
               0.17    1.09 |  1.17   94.77 |  2.17    3.37 |  3.17    1.00
               0.33    1.53 |  1.33   36.99 |  2.33    2.60 |  3.33    0.87
               0.50    2.32 |  1.50   17.18 |  2.50    2.06 |  3.50    0.76
               0.67    3.95 |  1.67    9.92 |  2.67    1.68 |  3.67    0.67
               0.83    8.18 |  1.83    6.46 |  2.83    1.39 |  3.83    0.59


--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0005)|   Area    (ha)=   6.76   Curve Number   (CN)= 71.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.24

        NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.

                              ---- TRANSFORMED HYETOGRAPH ----
               TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083   0.81 | 1.083   27.06 | 2.083    4.54 |  3.08    1.17
               0.167   0.81 | 1.167   27.06 | 2.167    4.54 |  3.17    1.17
               0.250   1.09 | 1.250   94.77 | 2.250    3.37 |  3.25    1.00
               0.333   1.09 | 1.333   94.77 | 2.333    3.37 |  3.33    1.00
               0.417   1.53 | 1.417   36.99 | 2.417    2.60 |  3.42    0.87
               0.500   1.53 | 1.500   36.99 | 2.500    2.60 |  3.50    0.87
               0.583   2.32 | 1.583   17.18 | 2.583    2.06 |  3.58    0.76
               0.667   2.32 | 1.667   17.18 | 2.667    2.06 |  3.67    0.76
               0.750   3.95 | 1.750    9.92 | 2.750    1.68 |  3.75    0.67
               0.833   3.95 | 1.833    9.92 | 2.833    1.68 |  3.83    0.67
               0.917   8.18 | 1.917    6.46 | 2.917    1.39 |  3.92    0.59
               1.000   8.18 | 2.000    6.46 | 3.000    1.39 |  4.00    0.59

    Unit Hyd Qpeak  (cms)=   1.067

    PEAK FLOW       (cms)=   0.180 (i)
    TIME TO PEAK    (hrs)=   1.583
    RUNOFF VOLUME    (mm)=   8.166
    TOTAL RAINFALL   (mm)=  38.492
    RUNOFF COEFFICIENT   =   0.212

    (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0004)|   Area    (ha)=   1.90   Curve Number   (CN)= 71.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.05

        NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.

                              ---- TRANSFORMED HYETOGRAPH ----
               TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083   0.81 | 1.083   27.06 | 2.083    4.54 |  3.08    1.17
               0.167   0.81 | 1.167   27.06 | 2.167    4.54 |  3.17    1.17
               0.250   1.09 | 1.250   94.77 | 2.250    3.37 |  3.25    1.00
               0.333   1.09 | 1.333   94.77 | 2.333    3.37 |  3.33    1.00
               0.417   1.53 | 1.417   36.99 | 2.417    2.60 |  3.42    0.87
               0.500   1.53 | 1.500   36.99 | 2.500    2.60 |  3.50    0.87
               0.583   2.32 | 1.583   17.18 | 2.583    2.06 |  3.58    0.76
               0.667   2.32 | 1.667   17.18 | 2.667    2.06 |  3.67    0.76
               0.750   3.95 | 1.750    9.92 | 2.750    1.68 |  3.75    0.67
               0.833   3.95 | 1.833    9.92 | 2.833    1.68 |  3.83    0.67
               0.917   8.18 | 1.917    6.46 | 2.917    1.39 |  3.92    0.59
               1.000   8.18 | 2.000    6.46 | 3.000    1.39 |  4.00    0.59

    Unit Hyd Qpeak  (cms)=   1.483

    PEAK FLOW       (cms)=   0.080 (i)
    TIME TO PEAK    (hrs)=   1.333
    RUNOFF VOLUME    (mm)=   6.131
    TOTAL RAINFALL   (mm)=  38.492
    RUNOFF COEFFICIENT   =   0.159

    (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0007)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0004):      1.90   0.080     1.33     6.13
     + ID2= 2 (  0005):      6.76   0.180     1.58     8.17
       ==========================================================
       ID = 3 (  0007):      8.67   0.211     1.50     7.72

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0003)|   Area    (ha)=   1.10
|ID= 1 DT= 5.0 min |   Total Imp(%)=  38.73   Dir. Conn.(%)=  38.73
--------------------

                         IMPERVIOUS    PERVIOUS (i)
    Surface Area     (ha)=      0.43         0.68
    Dep. Storage     (mm)=      1.00         1.50
    Average Slope     (%)=      1.00         2.00
    Length            (m)=     85.76        40.00
    Mannings n           =     0.013        0.250

        NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.

                              ---- TRANSFORMED HYETOGRAPH ----
               TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083   0.81 | 1.083   27.06 | 2.083    4.54 |  3.08    1.17
               0.167   0.81 | 1.167   27.06 | 2.167    4.54 |  3.17    1.17
               0.250   1.09 | 1.250   94.77 | 2.250    3.37 |  3.25    1.00
               0.333   1.09 | 1.333   94.77 | 2.333    3.37 |  3.33    1.00
               0.417   1.53 | 1.417   36.99 | 2.417    2.60 |  3.42    0.87
               0.500   1.53 | 1.500   36.99 | 2.500    2.60 |  3.50    0.87
               0.583   2.32 | 1.583   17.18 | 2.583    2.06 |  3.58    0.76
               0.667   2.32 | 1.667   17.18 | 2.667    2.06 |  3.67    0.76
               0.750   3.95 | 1.750    9.92 | 2.750    1.68 |  3.75    0.67
               0.833   3.95 | 1.833    9.92 | 2.833    1.68 |  3.83    0.67
               0.917   8.18 | 1.917    6.46 | 2.917    1.39 |  3.92    0.59
               1.000   8.18 | 2.000    6.46 | 3.000    1.39 |  4.00    0.59

    Max.Eff.Inten.(mm/hr)=      94.77        17.92
              over (min)        5.00        20.00
    Storage Coeff.  (min)=      2.38 (ii)   16.42 (ii)
    Unit Hyd. Tpeak (min)=      5.00        20.00
    Unit Hyd. peak  (cms)=      0.30         0.06
                                                    *TOTALS*
```

```
     PEAK FLOW       (cms)=       0.11          0.02          0.117 (iii)
     TIME TO PEAK    (hrs)=       1.33          1.58           1.33
     RUNOFF VOLUME    (mm)=      37.49          9.72          20.47
     TOTAL RAINFALL   (mm)=      38.49         38.49          38.49
     RUNOFF COEFFICIENT   =       0.97          0.25           0.53

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0006)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------       (cms)     (ha.m.)   |   (cms)     (ha.m.)
                           0.0000      0.0000   |    0.0128      0.0500
                           0.0068      0.0100   |    0.0149      0.0700
                           0.0102      0.0300   |    0.0168      0.0991

                               AREA     QPEAK     TPEAK       R.V.
                               (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0003)     1.103     0.117      1.33      20.47
   OUTFLOW: ID= 1 (  0006)     1.103     0.008      2.50      20.13

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=  6.84
                  TIME SHIFT OF PEAK FLOW         (min)= 70.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.0173

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0008)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0006):     1.10   0.008     2.50    20.13
     + ID2= 2 (  0007):     8.67   0.211     1.50     7.72
       ================================================
       ID = 3 (  0008):     9.77   0.218     1.50     9.12

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
*********************************
** SIMULATION:3) 10-Year      **
*********************************
--------------------
| CHICAGO STORM    |    IDF curve parameters: A=2819.000
| Ptotal= 44.04 mm |                          B=  16.000
--------------------                          C=   1.000
                         used in:   INTENSITY =  A / (t + B)^C

                         Duration of storm  =  4.00 hrs
                         Storm time step    = 10.00 min
                         Time to peak ratio =  0.33

                TIME     RAIN |  TIME     RAIN |'  TIME     RAIN |  TIME     RAIN
                 hrs    mm/hr |   hrs    mm/hr |'   hrs    mm/hr |   hrs    mm/hr
                0.00     0.93 |  1.00    30.96 |  2.00     5.20 |  3.00     1.34
                0.17     1.24 |  1.17   108.42 |  2.17     3.85 |  3.17     1.15
                0.33     1.75 |  1.33    42.32 |  2.33     2.97 |  3.33     0.99
                0.50     2.66 |  1.50    19.65 |  2.50     2.36 |  3.50     0.87
                0.67     4.51 |  1.67    11.35 |  2.67     1.92 |  3.67     0.76
                0.83     9.35 |  1.83     7.39 |  2.83     1.59 |  3.83     0.68


--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0005)|   Area    (ha)=   6.76   Curve Number   (CN)= 71.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.24

        NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                          ---- TRANSFORMED HYETOGRAPH ----
                TIME     RAIN |  TIME     RAIN |'  TIME     RAIN |  TIME     RAIN
                 hrs    mm/hr |   hrs    mm/hr |'   hrs    mm/hr |   hrs    mm/hr
               0.083     0.93 | 1.083    30.96 | 2.083     5.20 |  3.08     1.34
               0.167     0.93 | 1.167    30.96 | 2.167     5.20 |  3.17     1.34
               0.250     1.24 | 1.250   108.42 | 2.250     3.85 |  3.25     1.15
               0.333     1.24 | 1.333   108.42 | 2.333     3.85 |  3.33     1.15
               0.417     1.75 | 1.417    42.32 | 2.417     2.97 |  3.42     0.99
               0.500     1.75 | 1.500    42.32 | 2.500     2.97 |  3.50     0.99
               0.583     2.66 | 1.583    19.65 | 2.583     2.36 |  3.58     0.87
               0.667     2.66 | 1.667    19.65 | 2.667     2.36 |  3.67     0.87
               0.750     4.51 | 1.750    11.35 | 2.750     1.92 |  3.75     0.76
               0.833     4.51 | 1.833    11.35 | 2.833     1.92 |  3.83     0.76
               0.917     9.35 | 1.917     7.39 | 2.917     1.59 |  3.92     0.68
               1.000     9.35 | 2.000     7.39 | 3.000     1.59 |  4.00     0.68

     Unit Hyd Qpeak  (cms)=   1.067

     PEAK FLOW       (cms)=   0.238 (i)
     TIME TO PEAK    (hrs)=   1.583
     RUNOFF VOLUME    (mm)=  10.663
     TOTAL RAINFALL   (mm)=  44.038
     RUNOFF COEFFICIENT   =   0.242

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0004)|   Area    (ha)=   1.90   Curve Number   (CN)= 71.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.05

        NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                          ---- TRANSFORMED HYETOGRAPH ----
                TIME     RAIN |  TIME     RAIN |'  TIME     RAIN |  TIME     RAIN
                 hrs    mm/hr |   hrs    mm/hr |'   hrs    mm/hr |   hrs    mm/hr
               0.083     0.93 | 1.083    30.96 | 2.083     5.20 |  3.08     1.34
               0.167     0.93 | 1.167    30.96 | 2.167     5.20 |  3.17     1.34
               0.250     1.24 | 1.250   108.42 | 2.250     3.85 |  3.25     1.15
               0.333     1.24 | 1.333   108.42 | 2.333     3.85 |  3.33     1.15
               0.417     1.75 | 1.417    42.32 | 2.417     2.97 |  3.42     0.99
               0.500     1.75 | 1.500    42.32 | 2.500     2.97 |  3.50     0.99
               0.583     2.66 | 1.583    19.65 | 2.583     2.36 |  3.58     0.87
               0.667     2.66 | 1.667    19.65 | 2.667     2.36 |  3.67     0.87
               0.750     4.51 | 1.750    11.35 | 2.750     1.92 |  3.75     0.76
               0.833     4.51 | 1.833    11.35 | 2.833     1.92 |  3.83     0.76
               0.917     9.35 | 1.917     7.39 | 2.917     1.59 |  3.92     0.68
               1.000     9.35 | 2.000     7.39 | 3.000     1.59 |  4.00     0.68

     Unit Hyd Qpeak  (cms)=   1.483

     PEAK FLOW       (cms)=   0.105 (i)
     TIME TO PEAK    (hrs)=   1.333
     RUNOFF VOLUME    (mm)=   8.006
     TOTAL RAINFALL   (mm)=  44.038
     RUNOFF COEFFICIENT   =   0.182

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0007)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0004):     1.90   0.105     1.33      8.01
     + ID2= 2 (  0005):     6.76   0.238     1.58     10.66
       ================================================
       ID = 3 (  0007):     8.67   0.279     1.50     10.08

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0003)|   Area    (ha)=   1.10
|ID= 1 DT= 5.0 min |   Total Imp(%)=  38.73   Dir. Conn.(%)=  38.73
--------------------

                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.43          0.68
     Dep. Storage     (mm)=       1.00          1.50
     Average Slope     (%)=       1.00          2.00
     Length            (m)=      85.76         40.00
     Mannings n            =      0.013         0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.
```

```
                        ---- TRANSFORMED HYETOGRAPH ----
  TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
   hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
 0.083    0.93 | 1.083   30.96 | 2.083    5.20 |  3.08    1.34
 0.167    0.93 | 1.167   30.96 | 2.167    5.20 |  3.17    1.34
 0.250    1.24 | 1.250  108.42 | 2.250    3.85 |  3.25    1.15
 0.333    1.24 | 1.333  108.42 | 2.333    3.85 |  3.33    1.15
 0.417    1.75 | 1.417   42.32 | 2.417    2.97 |  3.42    0.99
 0.500    1.75 | 1.500   42.32 | 2.500    2.97 |  3.50    0.99
 0.583    2.66 | 1.583   19.65 | 2.583    2.36 |  3.58    0.87
 0.667    2.66 | 1.667   19.65 | 2.667    2.36 |  3.67    0.87
 0.750    4.51 | 1.750   11.35 | 2.750    1.92 |  3.75    0.76
 0.833    4.51 | 1.833   11.35 | 2.833    1.92 |  3.83    0.76
 0.917    9.35 | 1.917    7.39 | 2.917    1.59 |  3.92    0.68
 1.000    9.35 | 2.000    7.39 | 3.000    1.59 |  4.00    0.68

     Max.Eff.Inten.(mm/hr)=     108.42        23.02
               over (min)         5.00        15.00
     Storage Coeff.  (min)=       2.26 (ii)   14.96 (ii)
     Unit Hyd. Tpeak (min)=       5.00        15.00
     Unit Hyd. peak  (cms)=       0.30         0.08
                                                    *TOTALS*
     PEAK FLOW       (cms)=       0.13         0.03          0.140 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.50            1.33
     RUNOFF VOLUME    (mm)=      43.04        12.37           24.24
     TOTAL RAINFALL   (mm)=      44.04        44.04           44.04
     RUNOFF COEFFICIENT   =       0.98         0.28            0.55

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0006)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000      0.0000   |    0.0128      0.0500
                          0.0068      0.0100   |    0.0149      0.0700
                          0.0102      0.0300   |    0.0168      0.0991

                               AREA     QPEAK     TPEAK       R.V.
                               (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0003)     1.103     0.140      1.33      24.24
   OUTFLOW: ID= 1 (  0006)     1.103     0.009      2.50      23.91

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=  6.19
                  TIME SHIFT OF PEAK FLOW         (min)= 70.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.0209

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0008)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0006):      1.10    0.009     2.50    23.91
     + ID2= 2 (  0007):      8.67    0.279     1.50    10.08
       ================================================
       ID = 3 (  0008):      9.77    0.287     1.50    11.64

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
*********************************
** SIMULATION:4) 25-Year      **
*********************************
--------------------
| CHICAGO STORM    |    IDF curve parameters: A=3886.000
| Ptotal= 60.23 mm |                          B=  18.000
--------------------                          C=   1.000
                         used in:   INTENSITY =  A / (t + B)^C

                         Duration of storm  =  4.00 hrs
                         Storm time step    = 10.00 min
                         Time to peak ratio =  0.33

                  TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                   hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                 0.00    1.41 |  1.00   43.05 |  2.00    7.72 |  3.00    2.04
                 0.17    1.89 |  1.17  138.79 |  2.17    5.76 |  3.17    1.74
                 0.33    2.65 |  1.33   58.11 |  2.33    4.46 |  3.33    1.51
                 0.50    4.00 |  1.50   28.06 |  2.50    3.56 |  3.50    1.32
                 0.67    6.73 |  1.67   16.53 |  2.67    2.90 |  3.67    1.16
                 0.83   13.69 |  1.83   10.90 |  2.83    2.41 |  3.83    1.03

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0005)|   Area     (ha)=   6.76   Curve Number    (CN)= 71.0
|ID= 1 DT= 5.0 min |   Ia       (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.24

        NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.

                        ---- TRANSFORMED HYETOGRAPH ----
  TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
   hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
 0.083    1.41 | 1.083   43.05 | 2.083    7.72 |  3.08    2.04
 0.167    1.41 | 1.167   43.05 | 2.167    7.72 |  3.17    2.04
 0.250    1.89 | 1.250  138.79 | 2.250    5.76 |  3.25    1.74
 0.333    1.89 | 1.333  138.79 | 2.333    5.76 |  3.33    1.74
 0.417    2.65 | 1.417   58.11 | 2.417    4.46 |  3.42    1.51
 0.500    2.65 | 1.500   58.11 | 2.500    4.46 |  3.50    1.51
 0.583    4.00 | 1.583   28.06 | 2.583    3.56 |  3.58    1.32
 0.667    4.00 | 1.667   28.06 | 2.667    3.56 |  3.67    1.32
 0.750    6.73 | 1.750   16.53 | 2.750    2.90 |  3.75    1.16
 0.833    6.73 | 1.833   16.53 | 2.833    2.90 |  3.83    1.16
 0.917   13.69 | 1.917   10.90 | 2.917    2.41 |  3.92    1.03
 1.000   13.69 | 2.000   10.90 | 3.000    2.41 |  4.00    1.03

     Unit Hyd Qpeak  (cms)=   1.067

     PEAK FLOW       (cms)=   0.420 (i)
     TIME TO PEAK    (hrs)=   1.583
     RUNOFF VOLUME    (mm)=  19.172
     TOTAL RAINFALL   (mm)=  60.234
     RUNOFF COEFFICIENT   =   0.318

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0004)|   Area     (ha)=   1.90   Curve Number    (CN)= 71.0
|ID= 1 DT= 5.0 min |   Ia       (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.05

        NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.

                        ---- TRANSFORMED HYETOGRAPH ----
  TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
   hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
 0.083    1.41 | 1.083   43.05 | 2.083    7.72 |  3.08    2.04
 0.167    1.41 | 1.167   43.05 | 2.167    7.72 |  3.17    2.04
 0.250    1.89 | 1.250  138.79 | 2.250    5.76 |  3.25    1.74
 0.333    1.89 | 1.333  138.79 | 2.333    5.76 |  3.33    1.74
 0.417    2.65 | 1.417   58.11 | 2.417    4.46 |  3.42    1.51
 0.500    2.65 | 1.500   58.11 | 2.500    4.46 |  3.50    1.51
 0.583    4.00 | 1.583   28.06 | 2.583    3.56 |  3.58    1.32
 0.667    4.00 | 1.667   28.06 | 2.667    3.56 |  3.67    1.32
 0.750    6.73 | 1.750   16.53 | 2.750    2.90 |  3.75    1.16
 0.833    6.73 | 1.833   16.53 | 2.833    2.90 |  3.83    1.16
 0.917   13.69 | 1.917   10.90 | 2.917    2.41 |  3.92    1.03
 1.000   13.69 | 2.000   10.90 | 3.000    2.41 |  4.00    1.03

     Unit Hyd Qpeak  (cms)=   1.483

     PEAK FLOW       (cms)=   0.180 (i)
     TIME TO PEAK    (hrs)=   1.333
     RUNOFF VOLUME    (mm)=  14.395
     TOTAL RAINFALL   (mm)=  60.234
     RUNOFF COEFFICIENT   =   0.239

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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| ADD HYD  (  0007)|
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|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
-------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0004):     1.90   0.180     1.33    14.39
     + ID2= 2 (  0005):     6.76   0.420     1.58    19.17
       ================================================
       ID = 3 (  0007):     8.67   0.494     1.50    18.12

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0003)|   Area    (ha)=   1.10
|ID= 1 DT= 5.0 min |   Total Imp(%)=  38.73   Dir. Conn.(%)=  38.73
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      0.43         0.68
     Dep. Storage     (mm)=      1.00         1.50
     Average Slope     (%)=      1.00         2.00
     Length            (m)=     85.76        40.00
     Mannings n           =     0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                              ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    1.41 | 1.083   43.05 | 2.083    7.72 |  3.08    2.04
               0.167    1.41 | 1.167   43.05 | 2.167    7.72 |  3.17    2.04
               0.250    1.89 | 1.250  138.79 | 2.250    5.76 |  3.25    1.74
               0.333    1.89 | 1.333  138.79 | 2.333    5.76 |  3.33    1.74
               0.417    2.65 | 1.417   58.11 | 2.417    4.46 |  3.42    1.51
               0.500    2.65 | 1.500   58.11 | 2.500    4.46 |  3.50    1.51
               0.583    4.00 | 1.583   28.06 | 2.583    3.56 |  3.58    1.32
               0.667    4.00 | 1.667   28.06 | 2.667    3.56 |  3.67    1.32
               0.750    6.73 | 1.750   16.53 | 2.750    2.90 |  3.75    1.16
               0.833    6.73 | 1.833   16.53 | 2.833    2.90 |  3.83    1.16
               0.917   13.69 | 1.917   10.90 | 2.917    2.41 |  3.92    1.03
               1.000   13.69 | 2.000   10.90 | 3.000    2.41 |  4.00    1.03

     Max.Eff.Inten.(mm/hr)=     138.79        43.97
               over (min)         5.00        15.00
     Storage Coeff.  (min)=       2.04 (ii)   11.85 (ii)
     Unit Hyd. Tpeak (min)=       5.00        15.00
     Unit Hyd. peak  (cms)=       0.31         0.09
                                                        *TOTALS*
     PEAK FLOW       (cms)=       0.16         0.05          0.188 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.50          1.33
     RUNOFF VOLUME    (mm)=      59.23        21.23         35.94
     TOTAL RAINFALL   (mm)=      60.23        60.23         60.23
     RUNOFF COEFFICIENT   =       0.98         0.35          0.60

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0006)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                           0.0000      0.0000   |    0.0128      0.0500
                           0.0068      0.0100   |    0.0149      0.0700
                           0.0102      0.0300   |    0.0168      0.0991

                               AREA     QPEAK     TPEAK       R.V.
                               (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0003)     1.103     0.188      1.33      35.94
   OUTFLOW: ID= 1 (  0006)     1.103     0.010      2.67      35.61

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=  5.55
                  TIME SHIFT OF PEAK FLOW         (min)= 80.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.0320

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--------------------
| ADD HYD  (  0008)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
-------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0006):     1.10   0.010     2.67    35.61
     + ID2= 2 (  0007):     8.67   0.494     1.50    18.12
       ================================================
       ID = 3 (  0008):     9.77   0.503     1.50    20.10

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
********************************
** SIMULATION:5) 50-Year      **
********************************
--------------------
| CHICAGO STORM    |    IDF curve parameters: A=4750.000
| Ptotal= 71.95 mm |                          B=  24.000
--------------------                          C=   1.000
                         used in:   INTENSITY =  A / (t + B)^C

                         Duration of storm  =  4.00 hrs
                         Storm time step    = 10.00 min
                         Time to peak ratio =  0.33

                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.00     2.18 |  1.00   52.37 |  2.00   11.13 |  3.00    3.12
               0.17     2.89 |  1.17  139.71 |  2.17    8.44 |  3.17    2.68
               0.33     4.02 |  1.33   68.44 |  2.33    6.62 |  3.33    2.33
               0.50     5.96 |  1.50   36.37 |  2.50    5.33 |  3.50    2.04
               0.67     9.77 |  1.67   22.56 |  2.67    4.38 |  3.67    1.81
               0.83    18.93 |  1.83   15.36 |  2.83    3.67 |  3.83    1.61


--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0005)|   Area    (ha)=   6.76   Curve Number   (CN)= 71.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.24

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                              ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    2.18 | 1.083   52.37 | 2.083   11.13 |  3.08    3.12
               0.167    2.18 | 1.167   52.37 | 2.167   11.13 |  3.17    3.12
               0.250    2.89 | 1.250  139.71 | 2.250    8.44 |  3.25    2.68
               0.333    2.89 | 1.333  139.71 | 2.333    8.44 |  3.33    2.68
               0.417    4.02 | 1.417   68.44 | 2.417    6.62 |  3.42    2.33
               0.500    4.02 | 1.500   68.44 | 2.500    6.62 |  3.50    2.33
               0.583    5.96 | 1.583   36.37 | 2.583    5.33 |  3.58    2.04
               0.667    5.96 | 1.667   36.37 | 2.667    5.33 |  3.67    2.04
               0.750    9.77 | 1.750   22.56 | 2.750    4.38 |  3.75    1.81
               0.833    9.77 | 1.833   22.56 | 2.833    4.38 |  3.83    1.81
               0.917   18.93 | 1.917   15.36 | 2.917    3.67 |  3.92    1.61
               1.000   18.93 | 2.000   15.36 | 3.000    3.67 |  4.00    1.61

     Unit Hyd Qpeak  (cms)=   1.067

     PEAK FLOW       (cms)=   0.520 (i)
     TIME TO PEAK    (hrs)=   1.583
     RUNOFF VOLUME    (mm)=  26.234
     TOTAL RAINFALL   (mm)=  71.949
     RUNOFF COEFFICIENT   =   0.365

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0004)|   Area    (ha)=   1.90   Curve Number   (CN)= 71.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.05

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                              ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    2.18 | 1.083   52.37 | 2.083   11.13 |  3.08    3.12
               0.167    2.18 | 1.167   52.37 | 2.167   11.13 |  3.17    3.12
               0.250    2.89 | 1.250  139.71 | 2.250    8.44 |  3.25    2.68
               0.333    2.89 | 1.333  139.71 | 2.333    8.44 |  3.33    2.68
```

0.417	4.02	1.417	68.44	2.417	6.62	3.42	2.33
0.500	4.02	1.500	68.44	2.500	6.62	3.50	2.33
0.583	5.96	1.583	36.37	2.583	5.33	3.58	2.04
0.667	5.96	1.667	36.37	2.667	5.33	3.67	2.04
0.750	9.77	1.750	22.56	2.750	4.38	3.75	1.81
0.833	9.77	1.833	22.56	2.833	4.38	3.83	1.81
0.917	18.93	1.917	15.36	2.917	3.67	3.92	1.61
1.000	18.93	2.000	15.36	3.000	3.67	4.00	1.61

Unit Hyd Qpeak (cms)= 1.483

PEAK FLOW (cms)= 0.202 (i)
TIME TO PEAK (hrs)= 1.333
RUNOFF VOLUME (mm)= 19.697
TOTAL RAINFALL (mm)= 71.949
RUNOFF COEFFICIENT = 0.274

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0007)		AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3		(ha)	(cms)	(hrs)	(mm)
ID1= 1 (0004):		1.90	0.202	1.33	19.70
+ ID2= 2 (0005):		6.76	0.520	1.58	26.23
ID = 3 (0007):		8.67	0.612	1.50	24.80

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB			
STANDHYD (0003)	Area (ha)=	1.10	
ID= 1 DT= 5.0 min	Total Imp(%)=	38.73	Dir. Conn.(%)= 38.73

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.43	0.68
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	85.76	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	2.18	1.083	52.37	2.083	11.13	3.08	3.12
0.167	2.18	1.167	52.37	2.167	11.13	3.17	3.12
0.250	2.89	1.250	139.71	2.250	8.44	3.25	2.68
0.333	2.89	1.333	139.71	2.333	8.44	3.33	2.68
0.417	4.02	1.417	68.44	2.417	6.62	3.42	2.33
0.500	4.02	1.500	68.44	2.500	6.62	3.50	2.33
0.583	5.96	1.583	36.37	2.583	5.33	3.58	2.04
0.667	5.96	1.667	36.37	2.667	5.33	3.67	2.04
0.750	9.77	1.750	22.56	2.750	4.38	3.75	1.81
0.833	9.77	1.833	22.56	2.833	4.38	3.83	1.81
0.917	18.93	1.917	15.36	2.917	3.67	3.92	1.61
1.000	18.93	2.000	15.36	3.000	3.67	4.00	1.61

Max.Eff.Inten.(mm/hr)=	139.71	49.88		
over (min)	5.00	15.00		
Storage Coeff. (min)=	2.04 (ii)	11.36 (ii)		
Unit Hyd. Tpeak (min)=	5.00	15.00		
Unit Hyd. peak (cms)=	0.31	0.09		
			TOTALS	
PEAK FLOW (cms)=	0.17	0.06	0.196 (iii)	
TIME TO PEAK (hrs)=	1.33	1.50	1.33	
RUNOFF VOLUME (mm)=	70.95	28.49	44.93	
TOTAL RAINFALL (mm)=	71.95	71.95	71.95	
RUNOFF COEFFICIENT =	0.99	0.40	0.62	

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 71.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

RESERVOIR(0006)	OVERFLOW IS OFF			
IN= 2---> OUT= 1				
DT= 5.0 min	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	0.0000	0.0000	0.0128	0.0500
	0.0068	0.0100	0.0149	0.0700
	0.0102	0.0300	0.0168	0.0991

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0003)	1.103	0.196	1.33	44.93
OUTFLOW: ID= 1 (0006)	1.103	0.011	2.92	44.60

PEAK FLOW REDUCTION [Qout/Qin](%)= 5.86
TIME SHIFT OF PEAK FLOW (min)= 95.00
MAXIMUM STORAGE USED (ha.m.)= 0.0400

ADD HYD (0008)		AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3		(ha)	(cms)	(hrs)	(mm)
ID1= 1 (0006):		1.10	0.011	2.92	44.60
+ ID2= 2 (0007):		8.67	0.612	1.50	24.80
ID = 3 (0008):		9.77	0.621	1.50	27.03

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

****
** SIMULATION:6) 100-Year **
****

CHICAGO STORM	IDF curve parameters:	A=5588.000
Ptotal= 83.38 mm		B= 28.000
		C= 1.000
	used in: INTENSITY = A / (t + B)^C	

Duration of storm = 4.00 hrs
Storm time step = 10.00 min
Time to peak ratio = 0.33

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.00	2.89	1.00	60.52	2.00	14.14	3.00	4.10
0.17	3.81	1.17	147.05	2.17	10.82	3.17	3.54
0.33	5.26	1.33	77.70	2.33	8.55	3.33	3.08
0.50	7.73	1.50	43.43	2.50	6.93	3.50	2.71
0.67	12.46	1.67	27.74	2.67	5.73	3.67	2.40
0.83	23.45	1.83	19.25	2.83	4.81	3.83	2.14

CALIB			
NASHYD (0005)	Area (ha)=	6.76	Curve Number (CN)= 71.0
ID= 1 DT= 5.0 min	Ia (mm)=	5.00	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)=	0.24	

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	2.89	1.083	60.52	2.083	14.14	3.08	4.10
0.167	2.89	1.167	60.52	2.167	14.14	3.17	4.10
0.250	3.81	1.250	147.05	2.250	10.82	3.25	3.54
0.333	3.81	1.333	147.05	2.333	10.82	3.33	3.54
0.417	5.26	1.417	77.70	2.417	8.55	3.42	3.08
0.500	5.26	1.500	77.70	2.500	8.55	3.50	3.08
0.583	7.73	1.583	43.43	2.583	6.93	3.58	2.71
0.667	7.73	1.667	43.43	2.667	6.93	3.67	2.71
0.750	12.46	1.750	27.74	2.750	5.73	3.75	2.40
0.833	12.46	1.833	27.74	2.833	5.73	3.83	2.40
0.917	23.45	1.917	19.25	2.917	4.81	3.92	2.14
1.000	23.45	2.000	19.25	3.000	4.81	4.00	2.14

Unit Hyd Qpeak (cms)= 1.067

PEAK FLOW (cms)= 0.634 (i)
TIME TO PEAK (hrs)= 1.583

```
     RUNOFF VOLUME    (mm)=  33.698
     TOTAL RAINFALL   (mm)=  83.375
     RUNOFF COEFFICIENT   =   0.404

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0004)|   Area     (ha)=   1.90   Curve Number   (CN)= 71.0
|ID= 1 DT= 5.0 min |   Ia       (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.05

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                        ---- TRANSFORMED HYETOGRAPH ----
               TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
              0.083    2.89 | 1.083   60.52 | 2.083   14.14 |  3.08    4.10
              0.167    2.89 | 1.167   60.52 | 2.167   14.14 |  3.17    4.10
              0.250    3.81 | 1.250  147.05 | 2.250   10.82 |  3.25    3.54
              0.333    3.81 | 1.333  147.05 | 2.333   10.82 |  3.33    3.54
              0.417    5.26 | 1.417   77.70 | 2.417    8.55 |  3.42    3.08
              0.500    5.26 | 1.500   77.70 | 2.500    8.55 |  3.50    3.08
              0.583    7.73 | 1.583   43.43 | 2.583    6.93 |  3.58    2.71
              0.667    7.73 | 1.667   43.43 | 2.667    6.93 |  3.67    2.71
              0.750   12.46 | 1.750   27.74 | 2.750    5.73 |  3.75    2.40
              0.833   12.46 | 1.833   27.74 | 2.833    5.73 |  3.83    2.40
              0.917   23.45 | 1.917   19.25 | 2.917    4.81 |  3.92    2.14
              1.000   23.45 | 2.000   19.25 | 3.000    4.81 |  4.00    2.14

     Unit Hyd Qpeak  (cms)=   1.483

     PEAK FLOW       (cms)=   0.235 (i)
     TIME TO PEAK    (hrs)=   1.333
     RUNOFF VOLUME    (mm)=  25.301
     TOTAL RAINFALL   (mm)=  83.375
     RUNOFF COEFFICIENT   =   0.303

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0007)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0004):     1.90   0.235     1.33    25.30
      + ID2= 2 (  0005):     6.76   0.634     1.58    33.70
        ================================================
        ID = 3 (  0007):     8.67   0.746     1.50    31.85

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0003)|   Area     (ha)=   1.10
|ID= 1 DT= 5.0 min |   Total Imp(%)=  38.73   Dir. Conn.(%)=  38.73
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      0.43         0.68
     Dep. Storage     (mm)=      1.00         1.50
     Average Slope     (%)=      1.00         2.00
     Length            (m)=     85.76        40.00
     Mannings n           =     0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                        ---- TRANSFORMED HYETOGRAPH ----
               TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
              0.083    2.89 | 1.083   60.52 | 2.083   14.14 |  3.08    4.10
              0.167    2.89 | 1.167   60.52 | 2.167   14.14 |  3.17    4.10
              0.250    3.81 | 1.250  147.05 | 2.250   10.82 |  3.25    3.54
              0.333    3.81 | 1.333  147.05 | 2.333   10.82 |  3.33    3.54
              0.417    5.26 | 1.417   77.70 | 2.417    8.55 |  3.42    3.08
              0.500    5.26 | 1.500   77.70 | 2.500    8.55 |  3.50    3.08
              0.583    7.73 | 1.583   43.43 | 2.583    6.93 |  3.58    2.71
              0.667    7.73 | 1.667   43.43 | 2.667    6.93 |  3.67    2.71
              0.750   12.46 | 1.750   27.74 | 2.750    5.73 |  3.75    2.40
              0.833   12.46 | 1.833   27.74 | 2.833    5.73 |  3.83    2.40
              0.917   23.45 | 1.917   19.25 | 2.917    4.81 |  3.92    2.14
              1.000   23.45 | 2.000   19.25 | 3.000    4.81 |  4.00    2.14

     Max.Eff.Inten.(mm/hr)=     147.05        57.97
               over (min)          5.00        15.00
     Storage Coeff.  (min)=       2.00 (ii)   10.77 (ii)
     Unit Hyd. Tpeak (min)=       5.00        15.00
     Unit Hyd. peak  (cms)=       0.31         0.09
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.17         0.08         0.214 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.50          1.33
     RUNOFF VOLUME    (mm)=      82.38        36.11         54.02
     TOTAL RAINFALL   (mm)=      83.38        83.38         83.38
     RUNOFF COEFFICIENT   =       0.99         0.43          0.65

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0006)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                           0.0000      0.0000   |    0.0128      0.0500
                           0.0068      0.0100   |    0.0149      0.0700
                           0.0102      0.0300   |    0.0168      0.0991

                                AREA     QPEAK     TPEAK        R.V.
                                (ha)     (cms)     (hrs)        (mm)
   INFLOW : ID= 2 (  0003)      1.103      0.214      1.33       54.02
   OUTFLOW: ID= 1 (  0006)      1.103      0.013      3.08       53.69

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=  5.90
                  TIME SHIFT OF PEAK FLOW          (min)=105.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.0484

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0008)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0006):     1.10   0.013     3.08    53.69
      + ID2= 2 (  0007):     8.67   0.746     1.50    31.85
        ================================================
        ID = 3 (  0008):     9.77   0.755     1.50    34.32

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
**********************************
** SIMULATION:7) 25mm Event   **
**********************************

--------------------
|    READ STORM    |    Filename: C:\Users\matthew.holmes\AppD
|                  |              ata\Local\Temp\
|                  |              ba0de818-8301-4386-a41f-797f6bfd41a2\402bd030
| Ptotal= 25.00 mm |    Comments: 25MM4HR
--------------------
               TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
              0.00    2.07 |  1.00    5.70 |  2.00    5.19 |  3.00    2.80
              0.17    2.27 |  1.17   10.78 |  2.17    4.47 |  3.17    2.62
              0.33    2.52 |  1.33   50.21 |  2.33    3.95 |  3.33    2.48
              0.50    2.88 |  1.50   13.37 |  2.50    3.56 |  3.50    2.35
              0.67    3.38 |  1.67    8.29 |  2.67    3.25 |  3.67    2.23
              0.83    4.18 |  1.83    6.30 |  2.83    3.01 |  3.83    2.14

--------------------------------------------------------------------------------

--------------------
| CALIB            |
| NASHYD   (  0005)|   Area     (ha)=   6.76   Curve Number   (CN)= 71.0
|ID= 1 DT= 5.0 min |   Ia       (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.24

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.
```

```
                          ---- TRANSFORMED HYETOGRAPH ----
  TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
   hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
 0.083    2.07 | 1.083    5.70 | 2.083    5.19 |  3.08    2.80
 0.167    2.07 | 1.167    5.70 | 2.167    5.19 |  3.17    2.80
 0.250    2.27 | 1.250   10.78 | 2.250    4.47 |  3.25    2.62
 0.333    2.27 | 1.333   10.78 | 2.333    4.47 |  3.33    2.62
 0.417    2.52 | 1.417   50.21 | 2.417    3.95 |  3.42    2.48
 0.500    2.52 | 1.500   50.21 | 2.500    3.95 |  3.50    2.48
 0.583    2.88 | 1.583   13.37 | 2.583    3.56 |  3.58    2.35
 0.667    2.88 | 1.667   13.37 | 2.667    3.56 |  3.67    2.35
 0.750    3.38 | 1.750    8.29 | 2.750    3.25 |  3.75    2.23
 0.833    3.38 | 1.833    8.29 | 2.833    3.25 |  3.83    2.23
 0.917    4.18 | 1.917    6.30 | 2.917    3.01 |  3.92    2.14
 1.000    4.18 | 2.000    6.30 | 3.000    3.01 |  4.00    2.14

     Unit Hyd Qpeak  (cms)=   1.067

     PEAK FLOW       (cms)=   0.043 (i)
     TIME TO PEAK    (hrs)=   1.750
     RUNOFF VOLUME    (mm)=   3.229
     TOTAL RAINFALL   (mm)=  24.997
     RUNOFF COEFFICIENT   =   0.129

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0004)|   Area     (ha)=   1.90   Curve Number    (CN)= 71.0
|ID= 1 DT= 5.0 min |   Ia       (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.05

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.

                          ---- TRANSFORMED HYETOGRAPH ----
  TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
   hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
 0.083    2.07 | 1.083    5.70 | 2.083    5.19 |  3.08    2.80
 0.167    2.07 | 1.167    5.70 | 2.167    5.19 |  3.17    2.80
 0.250    2.27 | 1.250   10.78 | 2.250    4.47 |  3.25    2.62
 0.333    2.27 | 1.333   10.78 | 2.333    4.47 |  3.33    2.62
 0.417    2.52 | 1.417   50.21 | 2.417    3.95 |  3.42    2.48
 0.500    2.52 | 1.500   50.21 | 2.500    3.95 |  3.50    2.48
 0.583    2.88 | 1.583   13.37 | 2.583    3.56 |  3.58    2.35
 0.667    2.88 | 1.667   13.37 | 2.667    3.56 |  3.67    2.35
 0.750    3.38 | 1.750    8.29 | 2.750    3.25 |  3.75    2.23
 0.833    3.38 | 1.833    8.29 | 2.833    3.25 |  3.83    2.23
 0.917    4.18 | 1.917    6.30 | 2.917    3.01 |  3.92    2.14
 1.000    4.18 | 2.000    6.30 | 3.000    3.01 |  4.00    2.14

     Unit Hyd Qpeak  (cms)=   1.483

     PEAK FLOW       (cms)=   0.022 (i)
     TIME TO PEAK    (hrs)=   1.500
     RUNOFF VOLUME    (mm)=   2.424
     TOTAL RAINFALL   (mm)=  24.997
     RUNOFF COEFFICIENT   =   0.097

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0007)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0004):     1.90   0.022     1.50     2.42
     + ID2= 2 (  0005):     6.76   0.043     1.75     3.23
       ==========================================================
       ID = 3 (  0007):     8.67   0.049     1.75     3.05

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0003)|   Area     (ha)=   1.10
|ID= 1 DT= 5.0 min |   Total Imp(%)=  38.73   Dir. Conn.(%)=  38.73
--------------------

                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      0.43          0.68
     Dep. Storage     (mm)=      1.00          1.50
     Average Slope     (%)=      1.00          2.00
```

```
     Length           (m)=     85.76         40.00
     Mannings n            =     0.013         0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.

                          ---- TRANSFORMED HYETOGRAPH ----
  TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
   hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
 0.083    2.07 | 1.083    5.70 | 2.083    5.19 |  3.08    2.80
 0.167    2.07 | 1.167    5.70 | 2.167    5.19 |  3.17    2.80
 0.250    2.27 | 1.250   10.78 | 2.250    4.47 |  3.25    2.62
 0.333    2.27 | 1.333   10.78 | 2.333    4.47 |  3.33    2.62
 0.417    2.52 | 1.417   50.21 | 2.417    3.95 |  3.42    2.48
 0.500    2.52 | 1.500   50.21 | 2.500    3.95 |  3.50    2.48
 0.583    2.88 | 1.583   13.37 | 2.583    3.56 |  3.58    2.35
 0.667    2.88 | 1.667   13.37 | 2.667    3.56 |  3.67    2.35
 0.750    3.38 | 1.750    8.29 | 2.750    3.25 |  3.75    2.23
 0.833    3.38 | 1.833    8.29 | 2.833    3.25 |  3.83    2.23
 0.917    4.18 | 1.917    6.30 | 2.917    3.01 |  3.92    2.14
 1.000    4.18 | 2.000    6.30 | 3.000    3.01 |  4.00    2.14

     Max.Eff.Inten.(mm/hr)=     50.21          4.41
           over (min)        5.00         30.00
     Storage Coeff.  (min)=    3.07 (ii)    27.67 (ii)
     Unit Hyd. Tpeak (min)=    5.00         30.00
     Unit Hyd. peak  (cms)=    0.27          0.04
                                                      *TOTALS*
     PEAK FLOW       (cms)=    0.06          0.00       0.059 (iii)
     TIME TO PEAK    (hrs)=    1.50          1.92        1.50
     RUNOFF VOLUME    (mm)=   24.00          4.34       11.94
     TOTAL RAINFALL   (mm)=   25.00         25.00       25.00
     RUNOFF COEFFICIENT   =    0.96          0.17        0.48

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0006)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000      0.0000   |   0.0128      0.0500
                          0.0068      0.0100   |   0.0149      0.0700
                          0.0102      0.0300   |   0.0168      0.0991

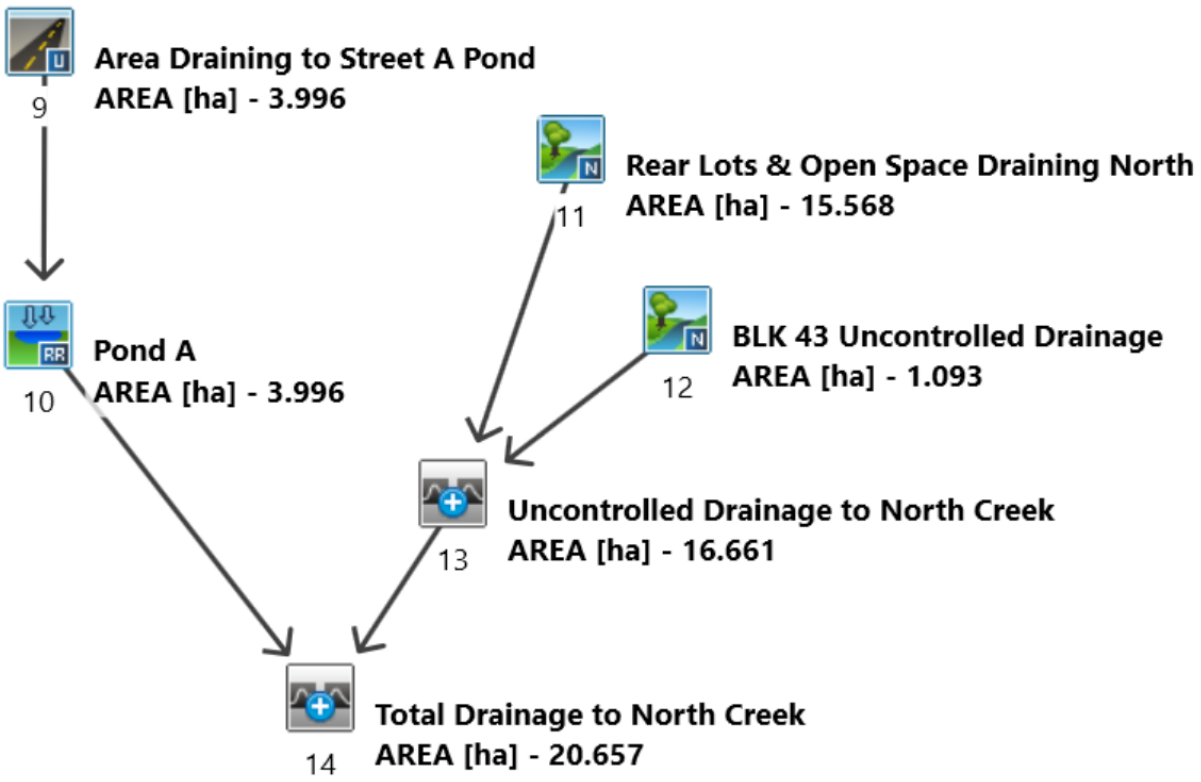
                              AREA     QPEAK     TPEAK       R.V.
                              (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0003)    1.103     0.059      1.50      11.94
   OUTFLOW: ID= 1 (  0006)    1.103     0.006      3.17      11.61

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=  9.40
                  TIME SHIFT OF PEAK FLOW          (min)=100.00
                  MAXIMUM  STORAGE   USED        (ha.m.)=  0.0081

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0008)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0006):     1.10   0.006     3.17    11.61
     + ID2= 2 (  0007):     8.67   0.049     1.75     3.05
       ==========================================================
       ID = 3 (  0008):     9.77   0.053     1.75     4.02

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
```



5868 COUNTY ROAD 65, PORT HOPE, ON
VISUAL OTTHYMO SCHEME POST-DEVELOPMENT FLOWS TO NORTHERN CREEK

D.G. BIDDLE & ASSOCIATES
CONSULTING ENGINEERS & PLANNERS
96 King Street East
Oshawa, Ontario, L1H 1B6
Phone: 905-576-8500
info@dgbiddle.com
dgbiddle.com

SCALE	N.T.S.
DRAWN	M.J.H.
DESIGN	M.J.H.
CHECKED	D.D.M.
DATE	JAN 2023

PROJECT 122049

DWG FIG 12

```
**********
** SIMULATION:1) 2-Year       **
**********
```

```
| CALIB             |
| NASHYD   (  0011)|   Area    (ha)=  15.57   Curve Number   (CN)= 71.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
                     U.H. Tp(hrs)=   0.53
```

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.49	1.083	18.95	2.083	2.84	3.08	0.71
0.167	0.49	1.167	18.95	2.167	2.84	3.17	0.71
0.250	0.66	1.250	77.30	2.250	2.09	3.25	0.61
0.333	0.66	1.333	77.30	2.333	2.09	3.33	0.61
0.417	0.93	1.417	26.45	2.417	1.60	3.42	0.52
0.500	0.93	1.500	26.45	2.500	1.60	3.50	0.52
0.583	1.43	1.583	11.48	2.583	1.26	3.58	0.46
0.667	1.43	1.667	11.48	2.667	1.26	3.67	0.46
0.750	2.46	1.750	6.42	2.750	1.02	3.75	0.40
0.833	2.46	1.833	6.42	2.833	1.02	3.83	0.40
0.917	5.25	1.917	4.10	2.917	0.85	3.92	0.35
1.000	5.25	2.000	4.10	3.000	0.85	4.00	0.35

```
Unit Hyd Qpeak  (cms)=   1.121

PEAK FLOW       (cms)=   0.134 (i)
TIME TO PEAK    (hrs)=   2.000
RUNOFF VOLUME    (mm)=   4.208
TOTAL RAINFALL   (mm)=  28.106
RUNOFF COEFFICIENT   =   0.150
```

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

```
| CALIB             |
| NASHYD   (  0012)|   Area    (ha)=   1.09   Curve Number   (CN)= 71.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
                     U.H. Tp(hrs)=   0.08
```

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.49	1.083	18.95	2.083	2.84	3.08	0.71
0.167	0.49	1.167	18.95	2.167	2.84	3.17	0.71
0.250	0.66	1.250	77.30	2.250	2.09	3.25	0.61
0.333	0.66	1.333	77.30	2.333	2.09	3.33	0.61
0.417	0.93	1.417	26.45	2.417	1.60	3.42	0.52
0.500	0.93	1.500	26.45	2.500	1.60	3.50	0.52
0.583	1.43	1.583	11.48	2.583	1.26	3.58	0.46
0.667	1.43	1.667	11.48	2.667	1.26	3.67	0.46
0.750	2.46	1.750	6.42	2.750	1.02	3.75	0.40
0.833	2.46	1.833	6.42	2.833	1.02	3.83	0.40
0.917	5.25	1.917	4.10	2.917	0.85	3.92	0.35
1.000	5.25	2.000	4.10	3.000	0.85	4.00	0.35

```
Unit Hyd Qpeak  (cms)=   0.531

PEAK FLOW       (cms)=   0.026 (i)
TIME TO PEAK    (hrs)=   1.333
RUNOFF VOLUME    (mm)=   3.956
TOTAL RAINFALL   (mm)=  28.106
RUNOFF COEFFICIENT   =   0.141
```

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

```
| ADD HYD  (  0013)|
|   1 +  2 =  3    |
```

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0011):	15.57	0.134	2.00	4.21
+ ID2= 2 (0012):	1.09	0.026	1.33	3.96
ID = 3 (0013):	16.66	0.138	2.00	4.19

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

```
| CALIB             |
| STANDHYD (  0009)|   Area    (ha)=   4.00
|ID= 1 DT= 5.0 min |   Total Imp(%)=  25.96   Dir. Conn.(%)=  25.96
```

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	1.04	2.96
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	163.22	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.49	1.083	18.95	2.083	2.84	3.08	0.71
0.167	0.49	1.167	18.95	2.167	2.84	3.17	0.71
0.250	0.66	1.250	77.30	2.250	2.09	3.25	0.61
0.333	0.66	1.333	77.30	2.333	2.09	3.33	0.61
0.417	0.93	1.417	26.45	2.417	1.60	3.42	0.52
0.500	0.93	1.500	26.45	2.500	1.60	3.50	0.52
0.583	1.43	1.583	11.48	2.583	1.26	3.58	0.46
0.667	1.43	1.667	11.48	2.667	1.26	3.67	0.46
0.750	2.46	1.750	6.42	2.750	1.02	3.75	0.40
0.833	2.46	1.833	6.42	2.833	1.02	3.83	0.40
0.917	5.25	1.917	4.10	2.917	0.85	3.92	0.35
1.000	5.25	2.000	4.10	3.000	0.85	4.00	0.35

				TOTALS
Max.Eff.Inten.(mm/hr)=		77.30	10.09	
over (min)		5.00	25.00	
Storage Coeff. (min)=		3.80 (ii)	21.46 (ii)	
Unit Hyd. Tpeak (min)=		5.00	25.00	
Unit Hyd. peak (cms)=		0.25	0.05	
PEAK FLOW	(cms)=	0.21	0.04	0.220 (iii)
TIME TO PEAK	(hrs)=	1.33	1.67	1.33
RUNOFF VOLUME	(mm)=	27.11	5.43	11.05
TOTAL RAINFALL	(mm)=	28.11	28.11	28.11
RUNOFF COEFFICIENT	=	0.96	0.19	0.39

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 71.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

```
| RESERVOIR(  0010)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |
```

OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
0.0000	0.0000	0.4460	0.0876
0.0070	0.0249	1.0060	0.1260
0.0690	0.0540	1.7020	0.1693

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0009)	3.996	0.220	1.33	11.05
OUTFLOW: ID= 1 (0010)	3.996	0.024	2.42	10.83

```
PEAK   FLOW   REDUCTION [Qout/Qin](%)= 10.83
TIME SHIFT OF PEAK FLOW          (min)= 65.00
MAXIMUM  STORAGE   USED        (ha.m.)=  0.0328
```

```
| ADD HYD  (  0014)|
|   1 +  2 =  3    |
```

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0010):	4.00	0.024	2.42	10.83
+ ID2= 2 (0013):	16.66	0.138	2.00	4.19
ID = 3 (0014):	20.66	0.158	2.00	5.48

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

****
** SIMULATION:2) 5-Year **
****

CALIB					
NASHYD (0011)	Area	(ha)= 15.57	Curve Number	(CN)= 71.0	
ID= 1 DT= 5.0 min	Ia	(mm)= 5.00	# of Linear Res.(N)= 3.00		
	U.H. Tp(hrs)= 0.53				

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.81	1.083	27.06	2.083	4.54	3.08	1.17
0.167	0.81	1.167	27.06	2.167	4.54	3.17	1.17
0.250	1.09	1.250	94.77	2.250	3.37	3.25	1.00
0.333	1.09	1.333	94.77	2.333	3.37	3.33	1.00
0.417	1.53	1.417	36.99	2.417	2.60	3.42	0.87
0.500	1.53	1.500	36.99	2.500	2.60	3.50	0.87
0.583	2.32	1.583	17.18	2.583	2.06	3.58	0.76
0.667	2.32	1.667	17.18	2.667	2.06	3.67	0.76
0.750	3.95	1.750	9.92	2.750	1.68	3.75	0.67
0.833	3.95	1.833	9.92	2.833	1.68	3.83	0.67
0.917	8.18	1.917	6.46	2.917	1.39	3.92	0.59
1.000	8.18	2.000	6.46	3.000	1.39	4.00	0.59

Unit Hyd Qpeak (cms)= 1.121

PEAK FLOW (cms)= 0.253 (i)
TIME TO PEAK (hrs)= 2.000
RUNOFF VOLUME (mm)= 8.173
TOTAL RAINFALL (mm)= 38.492
RUNOFF COEFFICIENT = 0.212

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB					
NASHYD (0012)	Area	(ha)= 1.09	Curve Number	(CN)= 71.0	
ID= 1 DT= 5.0 min	Ia	(mm)= 5.00	# of Linear Res.(N)= 3.00		
	U.H. Tp(hrs)= 0.08				

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.81	1.083	27.06	2.083	4.54	3.08	1.17
0.167	0.81	1.167	27.06	2.167	4.54	3.17	1.17
0.250	1.09	1.250	94.77	2.250	3.37	3.25	1.00
0.333	1.09	1.333	94.77	2.333	3.37	3.33	1.00
0.417	1.53	1.417	36.99	2.417	2.60	3.42	0.87
0.500	1.53	1.500	36.99	2.500	2.60	3.50	0.87
0.583	2.32	1.583	17.18	2.583	2.06	3.58	0.76
0.667	2.32	1.667	17.18	2.667	2.06	3.67	0.76
0.750	3.95	1.750	9.92	2.750	1.68	3.75	0.67
0.833	3.95	1.833	9.92	2.833	1.68	3.83	0.67
0.917	8.18	1.917	6.46	2.917	1.39	3.92	0.59
1.000	8.18	2.000	6.46	3.000	1.39	4.00	0.59

Unit Hyd Qpeak (cms)= 0.531

PEAK FLOW (cms)= 0.046 (i)
TIME TO PEAK (hrs)= 1.333
RUNOFF VOLUME (mm)= 7.684
TOTAL RAINFALL (mm)= 38.492
RUNOFF COEFFICIENT = 0.200

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0013)		AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3		(ha)	(cms)	(hrs)	(mm)
ID1= 1 (0011):		15.57	0.253	2.00	8.17
+ ID2= 2 (0012):		1.09	0.046	1.33	7.68
ID = 3 (0013):		16.66	0.261	2.00	8.14

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB					
STANDHYD (0009)	Area	(ha)= 4.00			
ID= 1 DT= 5.0 min	Total Imp(%)= 25.96		Dir. Conn.(%)= 25.96		

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	1.04	2.96
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	163.22	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.81	1.083	27.06	2.083	4.54	3.08	1.17
0.167	0.81	1.167	27.06	2.167	4.54	3.17	1.17
0.250	1.09	1.250	94.77	2.250	3.37	3.25	1.00
0.333	1.09	1.333	94.77	2.333	3.37	3.33	1.00
0.417	1.53	1.417	36.99	2.417	2.60	3.42	0.87
0.500	1.53	1.500	36.99	2.500	2.60	3.50	0.87
0.583	2.32	1.583	17.18	2.583	2.06	3.58	0.76
0.667	2.32	1.667	17.18	2.667	2.06	3.67	0.76
0.750	3.95	1.750	9.92	2.750	1.68	3.75	0.67
0.833	3.95	1.833	9.92	2.833	1.68	3.83	0.67
0.917	8.18	1.917	6.46	2.917	1.39	3.92	0.59
1.000	8.18	2.000	6.46	3.000	1.39	4.00	0.59

Max.Eff.Inten.(mm/hr)=		94.77	17.92		
over (min)		5.00	20.00		
Storage Coeff. (min)=		3.50 (ii)	17.54 (ii)		
Unit Hyd. Tpeak (min)=		5.00	20.00		
Unit Hyd. peak (cms)=		0.26	0.06		
				TOTALS	
PEAK FLOW	(cms)=	0.26	0.08	0.288 (iii)	
TIME TO PEAK	(hrs)=	1.33	1.67	1.33	
RUNOFF VOLUME	(mm)=	37.49	9.72	16.93	
TOTAL RAINFALL	(mm)=	38.49	38.49	38.49	
RUNOFF COEFFICIENT	=	0.97	0.25	0.44	

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 71.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

RESERVOIR(0010)	OVERFLOW IS OFF			
IN= 2---> OUT= 1				
DT= 5.0 min	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	0.0000	0.0000	0.4460	0.0876
	0.0070	0.0249	1.0060	0.1260
	0.0690	0.0540	1.7020	0.1693

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0009)	3.996	0.288	1.33	16.93
OUTFLOW: ID= 1 (0010)	3.996	0.050	2.17	16.70

PEAK FLOW REDUCTION [Qout/Qin](%)= 17.54
TIME SHIFT OF PEAK FLOW (min)= 50.00
MAXIMUM STORAGE USED (ha.m.)= 0.0454

ADD HYD (0014)		AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3		(ha)	(cms)	(hrs)	(mm)
ID1= 1 (0010):		4.00	0.050	2.17	16.70
+ ID2= 2 (0013):		16.66	0.261	2.00	8.14

```
        ID = 3 (  0014):    20.66   0.310     2.00     9.80

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
**********
** SIMULATION:3) 10-Year      **
**********
--------------------
| CALIB            |
| NASHYD   (  0011)|   Area    (ha)=  15.57   Curve Number   (CN)= 71.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.53

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.

                          ---- TRANSFORMED HYETOGRAPH ----
    TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
     hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
   0.083    0.93 | 1.083   30.96 | 2.083    5.20 |  3.08    1.34
   0.167    0.93 | 1.167   30.96 | 2.167    5.20 |  3.17    1.34
   0.250    1.24 | 1.250  108.42 | 2.250    3.85 |  3.25    1.15
   0.333    1.24 | 1.333  108.42 | 2.333    3.85 |  3.33    1.15
   0.417    1.75 | 1.417   42.32 | 2.417    2.97 |  3.42    0.99
   0.500    1.75 | 1.500   42.32 | 2.500    2.97 |  3.50    0.99
   0.583    2.66 | 1.583   19.65 | 2.583    2.36 |  3.58    0.87
   0.667    2.66 | 1.667   19.65 | 2.667    2.36 |  3.67    0.87
   0.750    4.51 | 1.750   11.35 | 2.750    1.92 |  3.75    0.76
   0.833    4.51 | 1.833   11.35 | 2.833    1.92 |  3.83    0.76
   0.917    9.35 | 1.917    7.39 | 2.917    1.59 |  3.92    0.68
   1.000    9.35 | 2.000    7.39 | 3.000    1.59 |  4.00    0.68

     Unit Hyd Qpeak  (cms)=   1.121

     PEAK FLOW       (cms)=   0.333 (i)
     TIME TO PEAK    (hrs)=   2.000
     RUNOFF VOLUME    (mm)=  10.673
     TOTAL RAINFALL   (mm)=  44.038
     RUNOFF COEFFICIENT   =   0.242

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0012)|   Area    (ha)=   1.09   Curve Number   (CN)= 71.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.08

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.

                          ---- TRANSFORMED HYETOGRAPH ----
    TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
     hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
   0.083    0.93 | 1.083   30.96 | 2.083    5.20 |  3.08    1.34
   0.167    0.93 | 1.167   30.96 | 2.167    5.20 |  3.17    1.34
   0.250    1.24 | 1.250  108.42 | 2.250    3.85 |  3.25    1.15
   0.333    1.24 | 1.333  108.42 | 2.333    3.85 |  3.33    1.15
   0.417    1.75 | 1.417   42.32 | 2.417    2.97 |  3.42    0.99
   0.500    1.75 | 1.500   42.32 | 2.500    2.97 |  3.50    0.99
   0.583    2.66 | 1.583   19.65 | 2.583    2.36 |  3.58    0.87
   0.667    2.66 | 1.667   19.65 | 2.667    2.36 |  3.67    0.87
   0.750    4.51 | 1.750   11.35 | 2.750    1.92 |  3.75    0.76
   0.833    4.51 | 1.833   11.35 | 2.833    1.92 |  3.83    0.76
   0.917    9.35 | 1.917    7.39 | 2.917    1.59 |  3.92    0.68
   1.000    9.35 | 2.000    7.39 | 3.000    1.59 |  4.00    0.68

     Unit Hyd Qpeak  (cms)=   0.531

     PEAK FLOW       (cms)=   0.062 (i)
     TIME TO PEAK    (hrs)=   1.333
     RUNOFF VOLUME    (mm)=  10.033
     TOTAL RAINFALL   (mm)=  44.038
     RUNOFF COEFFICIENT   =   0.228

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| ADD HYD  (  0013)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0011):    15.57   0.333     2.00    10.67
     + ID2= 2 (  0012):     1.09   0.062     1.33    10.03
       ================================================
       ID = 3 (  0013):    16.66   0.343     2.00    10.63

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0009)|   Area    (ha)=   4.00
|ID= 1 DT= 5.0 min |   Total Imp(%)=  25.96   Dir. Conn.(%)=  25.96
--------------------

                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      1.04          2.96
     Dep. Storage     (mm)=      1.00          1.50
     Average Slope     (%)=      1.00          2.00
     Length            (m)=    163.22         40.00
     Mannings n            =     0.013         0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.

                          ---- TRANSFORMED HYETOGRAPH ----
    TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
     hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
   0.083    0.93 | 1.083   30.96 | 2.083    5.20 |  3.08    1.34
   0.167    0.93 | 1.167   30.96 | 2.167    5.20 |  3.17    1.34
   0.250    1.24 | 1.250  108.42 | 2.250    3.85 |  3.25    1.15
   0.333    1.24 | 1.333  108.42 | 2.333    3.85 |  3.33    1.15
   0.417    1.75 | 1.417   42.32 | 2.417    2.97 |  3.42    0.99
   0.500    1.75 | 1.500   42.32 | 2.500    2.97 |  3.50    0.99
   0.583    2.66 | 1.583   19.65 | 2.583    2.36 |  3.58    0.87
   0.667    2.66 | 1.667   19.65 | 2.667    2.36 |  3.67    0.87
   0.750    4.51 | 1.750   11.35 | 2.750    1.92 |  3.75    0.76
   0.833    4.51 | 1.833   11.35 | 2.833    1.92 |  3.83    0.76
   0.917    9.35 | 1.917    7.39 | 2.917    1.59 |  3.92    0.68
   1.000    9.35 | 2.000    7.39 | 3.000    1.59 |  4.00    0.68

     Max.Eff.Inten.(mm/hr)=    108.42         23.02
               over (min)        5.00         20.00
     Storage Coeff.  (min)=      3.32 (ii)    16.02 (ii)
     Unit Hyd. Tpeak (min)=      5.00         20.00
     Unit Hyd. peak  (cms)=      0.26          0.06
                                                      *TOTALS*
     PEAK FLOW       (cms)=      0.30          0.11      0.337 (iii)
     TIME TO PEAK    (hrs)=      1.33          1.58       1.33
     RUNOFF VOLUME    (mm)=     43.04         12.37      20.33
     TOTAL RAINFALL   (mm)=     44.04         44.04      44.04
     RUNOFF COEFFICIENT   =      0.98          0.28       0.46

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0010)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000      0.0000   |    0.4460      0.0876
                          0.0070      0.0249   |    1.0060      0.1260
                          0.0690      0.0540   |    1.7020      0.1693

                               AREA     QPEAK     TPEAK       R.V.
                               (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0009)     3.996     0.337      1.33      20.33
   OUTFLOW: ID= 1 (  0010)     3.996     0.066      2.17      20.10

                PEAK   FLOW   REDUCTION [Qout/Qin](%)= 19.70
                TIME SHIFT OF PEAK FLOW          (min)= 50.00
                MAXIMUM  STORAGE   USED       (ha.m.)=  0.0529

--------------------------------------------------------------------------------
--------------------
| ADD HYD  (  0014)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0010):     4.00   0.066     2.17    20.10
```

```
      + ID2= 2 (  0013):    16.66   0.343     2.00    10.63
        ==========================================
        ID = 3 (  0014):    20.66   0.408     2.00    12.46

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
*********************************
** SIMULATION:4) 25-Year      **
*********************************
--------------------
| CALIB            |
| NASHYD   (  0011)|   Area     (ha)=  15.57   Curve Number   (CN)= 71.0
|ID= 1 DT= 5.0 min |   Ia       (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.53

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                        ---- TRANSFORMED HYETOGRAPH ----
  TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
   hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
 0.083    1.41 | 1.083   43.05 | 2.083    7.72 |  3.08    2.04
 0.167    1.41 | 1.167   43.05 | 2.167    7.72 |  3.17    2.04
 0.250    1.89 | 1.250  138.79 | 2.250    5.76 |  3.25    1.74
 0.333    1.89 | 1.333  138.79 | 2.333    5.76 |  3.33    1.74
 0.417    2.65 | 1.417   58.11 | 2.417    4.46 |  3.42    1.51
 0.500    2.65 | 1.500   58.11 | 2.500    4.46 |  3.50    1.51
 0.583    4.00 | 1.583   28.06 | 2.583    3.56 |  3.58    1.32
 0.667    4.00 | 1.667   28.06 | 2.667    3.56 |  3.67    1.32
 0.750    6.73 | 1.750   16.53 | 2.750    2.90 |  3.75    1.16
 0.833    6.73 | 1.833   16.53 | 2.833    2.90 |  3.83    1.16
 0.917   13.69 | 1.917   10.90 | 2.917    2.41 |  3.92    1.03
 1.000   13.69 | 2.000   10.90 | 3.000    2.41 |  4.00    1.03

     Unit Hyd Qpeak  (cms)=   1.121

     PEAK FLOW       (cms)=   0.592 (i)
     TIME TO PEAK    (hrs)=   2.000
     RUNOFF VOLUME    (mm)=  19.189
     TOTAL RAINFALL   (mm)=  60.234
     RUNOFF COEFFICIENT   =   0.319

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0012)|   Area     (ha)=   1.09   Curve Number   (CN)= 71.0
|ID= 1 DT= 5.0 min |   Ia       (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.08

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                        ---- TRANSFORMED HYETOGRAPH ----
  TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
   hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
 0.083    1.41 | 1.083   43.05 | 2.083    7.72 |  3.08    2.04
 0.167    1.41 | 1.167   43.05 | 2.167    7.72 |  3.17    2.04
 0.250    1.89 | 1.250  138.79 | 2.250    5.76 |  3.25    1.74
 0.333    1.89 | 1.333  138.79 | 2.333    5.76 |  3.33    1.74
 0.417    2.65 | 1.417   58.11 | 2.417    4.46 |  3.42    1.51
 0.500    2.65 | 1.500   58.11 | 2.500    4.46 |  3.50    1.51
 0.583    4.00 | 1.583   28.06 | 2.583    3.56 |  3.58    1.32
 0.667    4.00 | 1.667   28.06 | 2.667    3.56 |  3.67    1.32
 0.750    6.73 | 1.750   16.53 | 2.750    2.90 |  3.75    1.16
 0.833    6.73 | 1.833   16.53 | 2.833    2.90 |  3.83    1.16
 0.917   13.69 | 1.917   10.90 | 2.917    2.41 |  3.92    1.03
 1.000   13.69 | 2.000   10.90 | 3.000    2.41 |  4.00    1.03

     Unit Hyd Qpeak  (cms)=   0.531

     PEAK FLOW       (cms)=   0.108 (i)
     TIME TO PEAK    (hrs)=   1.333
     RUNOFF VOLUME    (mm)=  18.040
     TOTAL RAINFALL   (mm)=  60.234
     RUNOFF COEFFICIENT   =   0.299

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0013)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0011):    15.57   0.592     2.00    19.19
      + ID2= 2 (  0012):     1.09   0.108     1.33    18.04
        ================================================
        ID = 3 (  0013):    16.66   0.609     1.92    19.11

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0009)|   Area     (ha)=   4.00
|ID= 1 DT= 5.0 min |   Total Imp(%)=  25.96   Dir. Conn.(%)=  25.96
--------------------

                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.04         2.96
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     163.22        40.00
     Mannings n            =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                        ---- TRANSFORMED HYETOGRAPH ----
  TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
   hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
 0.083    1.41 | 1.083   43.05 | 2.083    7.72 |  3.08    2.04
 0.167    1.41 | 1.167   43.05 | 2.167    7.72 |  3.17    2.04
 0.250    1.89 | 1.250  138.79 | 2.250    5.76 |  3.25    1.74
 0.333    1.89 | 1.333  138.79 | 2.333    5.76 |  3.33    1.74
 0.417    2.65 | 1.417   58.11 | 2.417    4.46 |  3.42    1.51
 0.500    2.65 | 1.500   58.11 | 2.500    4.46 |  3.50    1.51
 0.583    4.00 | 1.583   28.06 | 2.583    3.56 |  3.58    1.32
 0.667    4.00 | 1.667   28.06 | 2.667    3.56 |  3.67    1.32
 0.750    6.73 | 1.750   16.53 | 2.750    2.90 |  3.75    1.16
 0.833    6.73 | 1.833   16.53 | 2.833    2.90 |  3.83    1.16
 0.917   13.69 | 1.917   10.90 | 2.917    2.41 |  3.92    1.03
 1.000   13.69 | 2.000   10.90 | 3.000    2.41 |  4.00    1.03

     Max.Eff.Inten.(mm/hr)=     138.79        43.97
               over (min)        5.00        15.00
     Storage Coeff.  (min)=       3.01 (ii)   12.81 (ii)
     Unit Hyd. Tpeak (min)=       5.00        15.00
     Unit Hyd. peak  (cms)=       0.28         0.08
                                                      *TOTALS*
     PEAK FLOW       (cms)=       0.39         0.22      0.492 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.50       1.33
     RUNOFF VOLUME    (mm)=      59.23        21.23      31.09
     TOTAL RAINFALL   (mm)=      60.23        60.23      60.23
     RUNOFF COEFFICIENT   =       0.98         0.35       0.52

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0010)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                           0.0000      0.0000  |    0.4460      0.0876
                           0.0070      0.0249  |    1.0060      0.1260
                           0.0690      0.0540  |    1.7020      0.1693

                                AREA     QPEAK     TPEAK        R.V.
                                (ha)     (cms)     (hrs)        (mm)
   INFLOW : ID= 2 (  0009)      3.996     0.492      1.33       31.09
   OUTFLOW: ID= 1 (  0010)      3.996     0.202      1.83       30.87

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 40.99
                  TIME SHIFT OF PEAK FLOW          (min)= 30.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.0660

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0014)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
```

```
--------------------          (ha)     (cms)     (hrs)      (mm)
       ID1= 1 (  0010):      4.00     0.202     1.83     30.87
     + ID2= 2 (  0013):     16.66     0.609     1.92     19.11
       ================================================
       ID = 3 (  0014):     20.66     0.803     1.92     21.39

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
*********************************
** SIMULATION:5) 50-Year      **
*********************************
--------------------
| CALIB            |
| NASHYD   (  0011)|   Area    (ha)=  15.57   Curve Number   (CN)= 71.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.53

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                          ---- TRANSFORMED HYETOGRAPH ----
              TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
               hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
             0.083    2.18 | 1.083   52.37 | 2.083   11.13 |  3.08    3.12
             0.167    2.18 | 1.167   52.37 | 2.167   11.13 |  3.17    3.12
             0.250    2.89 | 1.250  139.71 | 2.250    8.44 |  3.25    2.68
             0.333    2.89 | 1.333  139.71 | 2.333    8.44 |  3.33    2.68
             0.417    4.02 | 1.417   68.44 | 2.417    6.62 |  3.42    2.33
             0.500    4.02 | 1.500   68.44 | 2.500    6.62 |  3.50    2.33
             0.583    5.96 | 1.583   36.37 | 2.583    5.33 |  3.58    2.04
             0.667    5.96 | 1.667   36.37 | 2.667    5.33 |  3.67    2.04
             0.750    9.77 | 1.750   22.56 | 2.750    4.38 |  3.75    1.81
             0.833    9.77 | 1.833   22.56 | 2.833    4.38 |  3.83    1.81
             0.917   18.93 | 1.917   15.36 | 2.917    3.67 |  3.92    1.61
             1.000   18.93 | 2.000   15.36 | 3.000    3.67 |  4.00    1.61

     Unit Hyd Qpeak  (cms)=   1.121

     PEAK FLOW       (cms)=   0.766 (i)
     TIME TO PEAK    (hrs)=   2.000
     RUNOFF VOLUME    (mm)=  26.257
     TOTAL RAINFALL   (mm)=  71.949
     RUNOFF COEFFICIENT   =   0.365

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0012)|   Area    (ha)=   1.09   Curve Number   (CN)= 71.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.08

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                          ---- TRANSFORMED HYETOGRAPH ----
              TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
               hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
             0.083    2.18 | 1.083   52.37 | 2.083   11.13 |  3.08    3.12
             0.167    2.18 | 1.167   52.37 | 2.167   11.13 |  3.17    3.12
             0.250    2.89 | 1.250  139.71 | 2.250    8.44 |  3.25    2.68
             0.333    2.89 | 1.333  139.71 | 2.333    8.44 |  3.33    2.68
             0.417    4.02 | 1.417   68.44 | 2.417    6.62 |  3.42    2.33
             0.500    4.02 | 1.500   68.44 | 2.500    6.62 |  3.50    2.33
             0.583    5.96 | 1.583   36.37 | 2.583    5.33 |  3.58    2.04
             0.667    5.96 | 1.667   36.37 | 2.667    5.33 |  3.67    2.04
             0.750    9.77 | 1.750   22.56 | 2.750    4.38 |  3.75    1.81
             0.833    9.77 | 1.833   22.56 | 2.833    4.38 |  3.83    1.81
             0.917   18.93 | 1.917   15.36 | 2.917    3.67 |  3.92    1.61
             1.000   18.93 | 2.000   15.36 | 3.000    3.67 |  4.00    1.61

     Unit Hyd Qpeak  (cms)=   0.531

     PEAK FLOW       (cms)=   0.125 (i)
     TIME TO PEAK    (hrs)=   1.333
     RUNOFF VOLUME    (mm)=  24.685
     TOTAL RAINFALL   (mm)=  71.949
     RUNOFF COEFFICIENT   =   0.343

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| ADD HYD  (  0013)|
|   1 +  2 =  3    |          AREA     QPEAK     TPEAK      R.V.
--------------------          (ha)     (cms)     (hrs)      (mm)
       ID1= 1 (  0011):     15.57     0.766     2.00     26.26
     + ID2= 2 (  0012):      1.09     0.125     1.33     24.68
       ================================================
       ID = 3 (  0013):     16.66     0.793     2.00     26.15

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0009)|   Area    (ha)=   4.00
|ID= 1 DT= 5.0 min |   Total Imp(%)=  25.96   Dir. Conn.(%)=  25.96
--------------------

                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.04          2.96
     Dep. Storage     (mm)=       1.00          1.50
     Average Slope     (%)=       1.00          2.00
     Length            (m)=     163.22         40.00
     Mannings n            =      0.013         0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                          ---- TRANSFORMED HYETOGRAPH ----
              TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
               hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
             0.083    2.18 | 1.083   52.37 | 2.083   11.13 |  3.08    3.12
             0.167    2.18 | 1.167   52.37 | 2.167   11.13 |  3.17    3.12
             0.250    2.89 | 1.250  139.71 | 2.250    8.44 |  3.25    2.68
             0.333    2.89 | 1.333  139.71 | 2.333    8.44 |  3.33    2.68
             0.417    4.02 | 1.417   68.44 | 2.417    6.62 |  3.42    2.33
             0.500    4.02 | 1.500   68.44 | 2.500    6.62 |  3.50    2.33
             0.583    5.96 | 1.583   36.37 | 2.583    5.33 |  3.58    2.04
             0.667    5.96 | 1.667   36.37 | 2.667    5.33 |  3.67    2.04
             0.750    9.77 | 1.750   22.56 | 2.750    4.38 |  3.75    1.81
             0.833    9.77 | 1.833   22.56 | 2.833    4.38 |  3.83    1.81
             0.917   18.93 | 1.917   15.36 | 2.917    3.67 |  3.92    1.61
             1.000   18.93 | 2.000   15.36 | 3.000    3.67 |  4.00    1.61

     Max.Eff.Inten.(mm/hr)=     139.71         49.88
               over (min)          5.00         15.00
     Storage Coeff.  (min)=        3.00 (ii)    12.32 (ii)
     Unit Hyd. Tpeak (min)=        5.00         15.00
     Unit Hyd. peak  (cms)=        0.28          0.09
                                                          *TOTALS*
     PEAK FLOW       (cms)=        0.39          0.26       0.524 (iii)
     TIME TO PEAK    (hrs)=        1.33          1.50        1.33
     RUNOFF VOLUME    (mm)=       70.95         28.49       39.51
     TOTAL RAINFALL   (mm)=       71.95         71.95       71.95
     RUNOFF COEFFICIENT   =        0.99          0.40        0.55

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0010)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                           0.0000      0.0000  |    0.4460      0.0876
                           0.0070      0.0249  |    1.0060      0.1260
                           0.0690      0.0540  |    1.7020      0.1693

                                AREA     QPEAK     TPEAK      R.V.
                                (ha)     (cms)     (hrs)      (mm)
   INFLOW : ID= 2 (  0009)     3.996     0.524      1.33      39.51
   OUTFLOW: ID= 1 (  0010)     3.996     0.276      1.75      39.29

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 52.61
                  TIME SHIFT OF PEAK FLOW         (min)= 25.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.0726

--------------------------------------------------------------------------------

--------------------
```

```
| ADD HYD  (  0014)|
|   1 +  2 =  3    |          AREA     QPEAK     TPEAK      R.V.
-------------------          (ha)     (cms)     (hrs)      (mm)
       ID1= 1 (  0010):      4.00     0.276     1.75      39.29
     + ID2= 2 (  0013):     16.66     0.793     2.00      26.15
       ================================================
       ID = 3 (  0014):     20.66     1.048     1.92      28.69

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
```

```
*********************************
** SIMULATION:6) 100-Year      **
*********************************
```

```
--------------------
| CALIB            |
| NASHYD   (  0011)|   Area    (ha)=  15.57   Curve Number   (CN)= 71.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.53

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.
```

---- TRANSFORMED HYETOGRAPH ----							
TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	2.89	1.083	60.52	2.083	14.14	3.08	4.10
0.167	2.89	1.167	60.52	2.167	14.14	3.17	4.10
0.250	3.81	1.250	147.05	2.250	10.82	3.25	3.54
0.333	3.81	1.333	147.05	2.333	10.82	3.33	3.54
0.417	5.26	1.417	77.70	2.417	8.55	3.42	3.08
0.500	5.26	1.500	77.70	2.500	8.55	3.50	3.08
0.583	7.73	1.583	43.43	2.583	6.93	3.58	2.71
0.667	7.73	1.667	43.43	2.667	6.93	3.67	2.71
0.750	12.46	1.750	27.74	2.750	5.73	3.75	2.40
0.833	12.46	1.833	27.74	2.833	5.73	3.83	2.40
0.917	23.45	1.917	19.25	2.917	4.81	3.92	2.14
1.000	23.45	2.000	19.25	3.000	4.81	4.00	2.14

```
     Unit Hyd Qpeak  (cms)=   1.121

     PEAK FLOW       (cms)=   0.954 (i)
     TIME TO PEAK    (hrs)=   2.000
     RUNOFF VOLUME    (mm)=  33.727
     TOTAL RAINFALL   (mm)=  83.375
     RUNOFF COEFFICIENT   =   0.405

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
```

```
--------------------
| CALIB            |
| NASHYD   (  0012)|   Area    (ha)=   1.09   Curve Number   (CN)= 71.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.08

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.
```

---- TRANSFORMED HYETOGRAPH ----							
TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	2.89	1.083	60.52	2.083	14.14	3.08	4.10
0.167	2.89	1.167	60.52	2.167	14.14	3.17	4.10
0.250	3.81	1.250	147.05	2.250	10.82	3.25	3.54
0.333	3.81	1.333	147.05	2.333	10.82	3.33	3.54
0.417	5.26	1.417	77.70	2.417	8.55	3.42	3.08
0.500	5.26	1.500	77.70	2.500	8.55	3.50	3.08
0.583	7.73	1.583	43.43	2.583	6.93	3.58	2.71
0.667	7.73	1.667	43.43	2.667	6.93	3.67	2.71
0.750	12.46	1.750	27.74	2.750	5.73	3.75	2.40
0.833	12.46	1.833	27.74	2.833	5.73	3.83	2.40
0.917	23.45	1.917	19.25	2.917	4.81	3.92	2.14
1.000	23.45	2.000	19.25	3.000	4.81	4.00	2.14

```
     Unit Hyd Qpeak  (cms)=   0.531

     PEAK FLOW       (cms)=   0.147 (i)
     TIME TO PEAK    (hrs)=   1.333
     RUNOFF VOLUME    (mm)=  31.707
     TOTAL RAINFALL   (mm)=  83.375
     RUNOFF COEFFICIENT   =   0.380

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
```

```
--------------------
| ADD HYD  (  0013)|
|   1 +  2 =  3    |          AREA     QPEAK     TPEAK      R.V.
-------------------          (ha)     (cms)     (hrs)      (mm)
       ID1= 1 (  0011):     15.57     0.954     2.00      33.73
     + ID2= 2 (  0012):      1.09     0.147     1.33      31.71
       ================================================
       ID = 3 (  0013):     16.66     0.990     2.00      33.59

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
```

```
--------------------
| CALIB            |
| STANDHYD (  0009)|   Area    (ha)=   4.00
|ID= 1 DT= 5.0 min |   Total Imp(%)=  25.96   Dir. Conn.(%)=  25.96
--------------------
```

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	1.04	2.96
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	163.22	40.00
Mannings n	=	0.013	0.250

```
         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.
```

---- TRANSFORMED HYETOGRAPH ----							
TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	2.89	1.083	60.52	2.083	14.14	3.08	4.10
0.167	2.89	1.167	60.52	2.167	14.14	3.17	4.10
0.250	3.81	1.250	147.05	2.250	10.82	3.25	3.54
0.333	3.81	1.333	147.05	2.333	10.82	3.33	3.54
0.417	5.26	1.417	77.70	2.417	8.55	3.42	3.08
0.500	5.26	1.500	77.70	2.500	8.55	3.50	3.08
0.583	7.73	1.583	43.43	2.583	6.93	3.58	2.71
0.667	7.73	1.667	43.43	2.667	6.93	3.67	2.71
0.750	12.46	1.750	27.74	2.750	5.73	3.75	2.40
0.833	12.46	1.833	27.74	2.833	5.73	3.83	2.40
0.917	23.45	1.917	19.25	2.917	4.81	3.92	2.14
1.000	23.45	2.000	19.25	3.000	4.81	4.00	2.14

Max.Eff.Inten.(mm/hr)=		147.05	57.97	
over (min)		5.00	15.00	
Storage Coeff. (min)=		2.94 (ii)	11.72 (ii)	
Unit Hyd. Tpeak (min)=		5.00	15.00	
Unit Hyd. peak (cms)=		0.28	0.09	
				TOTALS
PEAK FLOW	(cms)=	0.42	0.32	0.582 (iii)
TIME TO PEAK	(hrs)=	1.33	1.50	1.33
RUNOFF VOLUME	(mm)=	82.38	36.11	48.12
TOTAL RAINFALL	(mm)=	83.38	83.38	83.38
RUNOFF COEFFICIENT	=	0.99	0.43	0.58

```
***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
```

```
--------------------
| RESERVOIR(  0010)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
-------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000      0.0000  |    0.4460      0.0876
                          0.0070      0.0249  |    1.0060      0.1260
                          0.0690      0.0540  |    1.7020      0.1693

                              AREA     QPEAK     TPEAK       R.V.
                              (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0009)    3.996     0.582      1.33       48.12
   OUTFLOW: ID= 1 (  0010)    3.996     0.355      1.75       47.89

                 PEAK   FLOW   REDUCTION [Qout/Qin](%)= 60.96
                 TIME SHIFT OF PEAK FLOW          (min)= 25.00
                 MAXIMUM  STORAGE   USED       (ha.m.)=  0.0795
```

```
--------------------
| ADD HYD  (  0014)|
|   1 +  2 =  3    |          AREA     QPEAK     TPEAK      R.V.
--------------------          (ha)     (cms)     (hrs)      (mm)
       ID1= 1 (  0010):      4.00    0.355     1.75     47.89
     + ID2= 2 (  0013):     16.66    0.990     2.00     33.59
       ================================================
       ID = 3 (  0014):     20.66    1.309     1.92     36.36

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
```

```
*********************************
** SIMULATION:7) 25mm Event    **
*********************************
--------------------
| CALIB            |
| NASHYD   (  0011)|   Area     (ha)=  15.57   Curve Number    (CN)= 71.0
|ID= 1 DT= 5.0 min |   Ia       (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.53

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.
```

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	2.07	1.083	5.70	2.083	5.19	3.08	2.80
0.167	2.07	1.167	5.70	2.167	5.19	3.17	2.80
0.250	2.27	1.250	10.78	2.250	4.47	3.25	2.62
0.333	2.27	1.333	10.78	2.333	4.47	3.33	2.62
0.417	2.52	1.417	50.21	2.417	3.95	3.42	2.48
0.500	2.52	1.500	50.21	2.500	3.95	3.50	2.48
0.583	2.88	1.583	13.37	2.583	3.56	3.58	2.35
0.667	2.88	1.667	13.37	2.667	3.56	3.67	2.35
0.750	3.38	1.750	8.29	2.750	3.25	3.75	2.23
0.833	3.38	1.833	8.29	2.833	3.25	3.83	2.23
0.917	4.18	1.917	6.30	2.917	3.01	3.92	2.14
1.000	4.18	2.000	6.30	3.000	3.01	4.00	2.14

```
     Unit Hyd Qpeak  (cms)=   1.121

     PEAK FLOW       (cms)=   0.065 (i)
     TIME TO PEAK    (hrs)=   2.250
     RUNOFF VOLUME    (mm)=   3.231
     TOTAL RAINFALL   (mm)=  24.997
     RUNOFF COEFFICIENT   =   0.129

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
```

```
--------------------
| CALIB            |
| NASHYD   (  0012)|   Area     (ha)=   1.09   Curve Number    (CN)= 71.0
|ID= 1 DT= 5.0 min |   Ia       (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.08

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.
```

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	2.07	1.083	5.70	2.083	5.19	3.08	2.80
0.167	2.07	1.167	5.70	2.167	5.19	3.17	2.80
0.250	2.27	1.250	10.78	2.250	4.47	3.25	2.62
0.333	2.27	1.333	10.78	2.333	4.47	3.33	2.62
0.417	2.52	1.417	50.21	2.417	3.95	3.42	2.48
0.500	2.52	1.500	50.21	2.500	3.95	3.50	2.48
0.583	2.88	1.583	13.37	2.583	3.56	3.58	2.35
0.667	2.88	1.667	13.37	2.667	3.56	3.67	2.35
0.750	3.38	1.750	8.29	2.750	3.25	3.75	2.23
0.833	3.38	1.833	8.29	2.833	3.25	3.83	2.23
0.917	4.18	1.917	6.30	2.917	3.01	3.92	2.14
1.000	4.18	2.000	6.30	3.000	3.01	4.00	2.14

```
     Unit Hyd Qpeak  (cms)=   0.531

     PEAK FLOW       (cms)=   0.013 (i)
     TIME TO PEAK    (hrs)=   1.500
     RUNOFF VOLUME    (mm)=   3.038
     TOTAL RAINFALL   (mm)=  24.997
     RUNOFF COEFFICIENT   =   0.122

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
```

```
--------------------
| ADD HYD  (  0013)|
|   1 +  2 =  3    |          AREA     QPEAK     TPEAK      R.V.
--------------------          (ha)     (cms)     (hrs)      (mm)
       ID1= 1 (  0011):     15.57    0.065     2.25      3.23
     + ID2= 2 (  0012):      1.09    0.013     1.50      3.04
       ================================================
       ID = 3 (  0013):     16.66    0.068     2.25      3.22

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
```

```
--------------------
| CALIB            |
| STANDHYD (  0009)|   Area     (ha)=   4.00
|ID= 1 DT= 5.0 min |   Total Imp(%)=  25.96   Dir. Conn.(%)=  25.96
--------------------

                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.04          2.96
     Dep. Storage     (mm)=       1.00          1.50
     Average Slope     (%)=       1.00          2.00
     Length            (m)=     163.22         40.00
     Mannings n           =      0.013         0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.
```

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	2.07	1.083	5.70	2.083	5.19	3.08	2.80
0.167	2.07	1.167	5.70	2.167	5.19	3.17	2.80
0.250	2.27	1.250	10.78	2.250	4.47	3.25	2.62
0.333	2.27	1.333	10.78	2.333	4.47	3.33	2.62
0.417	2.52	1.417	50.21	2.417	3.95	3.42	2.48
0.500	2.52	1.500	50.21	2.500	3.95	3.50	2.48
0.583	2.88	1.583	13.37	2.583	3.56	3.58	2.35
0.667	2.88	1.667	13.37	2.667	3.56	3.67	2.35
0.750	3.38	1.750	8.29	2.750	3.25	3.75	2.23
0.833	3.38	1.833	8.29	2.833	3.25	3.83	2.23
0.917	4.18	1.917	6.30	2.917	3.01	3.92	2.14
1.000	4.18	2.000	6.30	3.000	3.01	4.00	2.14

```
     Max.Eff.Inten.(mm/hr)=      50.21         4.41
           over (min)        5.00         30.00
     Storage Coeff.  (min)=    4.52 (ii)   29.12 (ii)
     Unit Hyd. Tpeak (min)=    5.00         30.00
     Unit Hyd. peak  (cms)=    0.23          0.04
                                                    *TOTALS*
     PEAK FLOW       (cms)=    0.13          0.02     0.136 (iii)
     TIME TO PEAK    (hrs)=    1.50          1.92       1.50
     RUNOFF VOLUME    (mm)=   24.00          4.34       9.44
     TOTAL RAINFALL   (mm)=   25.00         25.00      25.00
     RUNOFF COEFFICIENT   =    0.96          0.17       0.38

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
```

```
--------------------
| RESERVOIR(  0010)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000      0.0000   |    0.4460      0.0876
                          0.0070      0.0249   |    1.0060      0.1260
                          0.0690      0.0540   |    1.7020      0.1693

                              AREA     QPEAK     TPEAK       R.V.
                              (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0009)    3.996     0.136      1.50       9.44
   OUTFLOW: ID= 1 (  0010)    3.996     0.013      4.00       9.21

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=  9.63
                  TIME SHIFT OF PEAK FLOW         (min)=150.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.0278
```

```
--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0014)|
|   1 +  2 =  3    |          AREA     QPEAK     TPEAK      R.V.
--------------------          (ha)     (cms)     (hrs)      (mm)
       ID1= 1 (  0010):      4.00    0.013     4.00      9.21
     + ID2= 2 (  0013):     16.66    0.068     2.25      3.22
       ================================================
       ID = 3 (  0014):     20.66    0.074     2.25      4.38

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
```

19 **Area Draining to Street A Entrance Culvert**
AREA [ha] - 2.214

20 **Area Draining to Street A & B Int Culvert**
AREA [ha] - 0.085

21 **OLF Channel Culvert Under Street A**
AREA [ha] - 2.593

22 **Culvert from Street A to BLK 39 Pond**
AREA [ha] - 3.128

23 **Culvert from Street A to BLK 39 Pond**
AREA [ha] - 0.498

24 **Culvert under Street B to OLF**
AREA [ha] - 0.528

25 **Culvert under Street A to OLF Channel**
AREA [ha] - 0.258

26 **Culvert - OLF Channel to BLK 40**
AREA [ha] - 0.726

5868 COUNTY ROAD 65, PORT HOPE, ON
VISUAL OTTHYMO SCHEME POST-DEVELOPMENT FLOWS – REQUIRED FOR CULVERT SIZING

D.G. BIDDLE & ASSOCIATES
CONSULTING ENGINEERS & PLANNERS
96 King Street East
Oshawa, Ontario, L1H 1B6
Phone: 905-576-8500
info@dgbiddle.com
dgbiddle.com

SCALE	N.T.S.
DRAWN	M.J.H.
DESIGN	M.J.H.
CHECKED	D.D.M.
DATE	JAN 2023

PROJECT 122049

DWG FIG 13

```
*********************************
** SIMULATION:1) 2-Year        **
*********************************
--------------------
| CALIB            |
| STANDHYD (  0019)|   Area    (ha)=   2.21
|ID= 1 DT= 5.0 min |   Total Imp(%)=   6.87   Dir. Conn.(%)=   6.87
--------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.15          2.06
     Dep. Storage     (mm)=       1.00          1.50
     Average Slope     (%)=       1.00          2.00
     Length            (m)=     121.48         40.00
     Mannings n            =      0.013         0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                          ---- TRANSFORMED HYETOGRAPH ----
               TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
              0.083    0.49 | 1.083   18.95 | 2.083    2.84 |  3.08    0.71
              0.167    0.49 | 1.167   18.95 | 2.167    2.84 |  3.17    0.71
              0.250    0.66 | 1.250   77.30 | 2.250    2.09 |  3.25    0.61
              0.333    0.66 | 1.333   77.30 | 2.333    2.09 |  3.33    0.61
              0.417    0.93 | 1.417   26.45 | 2.417    1.60 |  3.42    0.52
              0.500    0.93 | 1.500   26.45 | 2.500    1.60 |  3.50    0.52
              0.583    1.43 | 1.583   11.48 | 2.583    1.26 |  3.58    0.46
              0.667    1.43 | 1.667   11.48 | 2.667    1.26 |  3.67    0.46
              0.750    2.46 | 1.750    6.42 | 2.750    1.02 |  3.75    0.40
              0.833    2.46 | 1.833    6.42 | 2.833    1.02 |  3.83    0.40
              0.917    5.25 | 1.917    4.10 | 2.917    0.85 |  3.92    0.35
              1.000    5.25 | 2.000    4.10 | 3.000    0.85 |  4.00    0.35

     Max.Eff.Inten.(mm/hr)=      77.30         10.09
               over (min)        5.00         25.00
     Storage Coeff.  (min)=      3.18 (ii)    20.85 (ii)
     Unit Hyd. Tpeak (min)=      5.00         25.00
     Unit Hyd. peak  (cms)=      0.27          0.05
                                                    *TOTALS*
     PEAK FLOW       (cms)=      0.03          0.03          0.038 (iii)
     TIME TO PEAK    (hrs)=      1.33          1.67          1.33
     RUNOFF VOLUME    (mm)=     27.11          5.43          6.91
     TOTAL RAINFALL   (mm)=     28.11         28.11         28.11
     RUNOFF COEFFICIENT   =      0.96          0.19          0.25

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
             YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
             CN*  =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0020)|   Area    (ha)=   0.09
|ID= 1 DT= 5.0 min |   Total Imp(%)=  36.36   Dir. Conn.(%)=  36.36
--------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.03          0.05
     Dep. Storage     (mm)=       1.00          1.50
     Average Slope     (%)=       1.00          2.00
     Length            (m)=      23.84         40.00
     Mannings n            =      0.013         0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                          ---- TRANSFORMED HYETOGRAPH ----
               TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
              0.083    0.49 | 1.083   18.95 | 2.083    2.84 |  3.08    0.71
              0.167    0.49 | 1.167   18.95 | 2.167    2.84 |  3.17    0.71
              0.250    0.66 | 1.250   77.30 | 2.250    2.09 |  3.25    0.61
              0.333    0.66 | 1.333   77.30 | 2.333    2.09 |  3.33    0.61
              0.417    0.93 | 1.417   26.45 | 2.417    1.60 |  3.42    0.52
              0.500    0.93 | 1.500   26.45 | 2.500    1.60 |  3.50    0.52
              0.583    1.43 | 1.583   11.48 | 2.583    1.26 |  3.58    0.46
              0.667    1.43 | 1.667   11.48 | 2.667    1.26 |  3.67    0.46
              0.750    2.46 | 1.750    6.42 | 2.750    1.02 |  3.75    0.40
              0.833    2.46 | 1.833    6.42 | 2.833    1.02 |  3.83    0.40
              0.917    5.25 | 1.917    4.10 | 2.917    0.85 |  3.92    0.35
              1.000    5.25 | 2.000    4.10 | 3.000    0.85 |  4.00    0.35

     Max.Eff.Inten.(mm/hr)=      77.30         10.09
               over (min)        5.00         20.00
     Storage Coeff.  (min)=      1.20 (ii)    18.86 (ii)
     Unit Hyd. Tpeak (min)=      5.00         20.00
     Unit Hyd. peak  (cms)=      0.33          0.06
                                                    *TOTALS*
     PEAK FLOW       (cms)=      0.01          0.00          0.007 (iii)
     TIME TO PEAK    (hrs)=      1.33          1.58          1.33
     RUNOFF VOLUME    (mm)=     27.11          5.43         13.05
     TOTAL RAINFALL   (mm)=     28.11         28.11         28.11
     RUNOFF COEFFICIENT   =      0.96          0.19          0.46

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
             CN*  =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0021)|   Area    (ha)=   2.59
|ID= 1 DT= 5.0 min |   Total Imp(%)=  21.41   Dir. Conn.(%)=  21.41
--------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.56          2.04
     Dep. Storage     (mm)=       1.00          1.50
     Average Slope     (%)=       1.00          2.00
     Length            (m)=     131.48         40.00
     Mannings n            =      0.013         0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                          ---- TRANSFORMED HYETOGRAPH ----
               TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
              0.083    0.49 | 1.083   18.95 | 2.083    2.84 |  3.08    0.71
              0.167    0.49 | 1.167   18.95 | 2.167    2.84 |  3.17    0.71
              0.250    0.66 | 1.250   77.30 | 2.250    2.09 |  3.25    0.61
              0.333    0.66 | 1.333   77.30 | 2.333    2.09 |  3.33    0.61
              0.417    0.93 | 1.417   26.45 | 2.417    1.60 |  3.42    0.52
              0.500    0.93 | 1.500   26.45 | 2.500    1.60 |  3.50    0.52
              0.583    1.43 | 1.583   11.48 | 2.583    1.26 |  3.58    0.46
              0.667    1.43 | 1.667   11.48 | 2.667    1.26 |  3.67    0.46
              0.750    2.46 | 1.750    6.42 | 2.750    1.02 |  3.75    0.40
              0.833    2.46 | 1.833    6.42 | 2.833    1.02 |  3.83    0.40
              0.917    5.25 | 1.917    4.10 | 2.917    0.85 |  3.92    0.35
              1.000    5.25 | 2.000    4.10 | 3.000    0.85 |  4.00    0.35

     Max.Eff.Inten.(mm/hr)=      77.30         10.09
               over (min)        5.00         25.00
     Storage Coeff.  (min)=      3.34 (ii)    21.00 (ii)
     Unit Hyd. Tpeak (min)=      5.00         25.00
     Unit Hyd. peak  (cms)=      0.26          0.05
                                                    *TOTALS*
     PEAK FLOW       (cms)=      0.11          0.03          0.121 (iii)
     TIME TO PEAK    (hrs)=      1.33          1.67          1.33
     RUNOFF VOLUME    (mm)=     27.11          5.43         10.07
     TOTAL RAINFALL   (mm)=     28.11         28.11         28.11
     RUNOFF COEFFICIENT   =      0.96          0.19          0.36

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
             CN*  =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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| CALIB            |
| STANDHYD (  0022)|   Area    (ha)=   3.13
|ID= 1 DT= 5.0 min |   Total Imp(%)=  23.51   Dir. Conn.(%)=  23.51
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                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.74          2.39
```

Dep. Storage	(mm)=	1.00	1.50	
Average Slope	(%)=	1.00	2.00	
Length	(m)=	144.41	40.00	
Mannings n	=	0.013	0.250	

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.49	1.083	18.95	2.083	2.84	3.08	0.71
0.167	0.49	1.167	18.95	2.167	2.84	3.17	0.71
0.250	0.66	1.250	77.30	2.250	2.09	3.25	0.61
0.333	0.66	1.333	77.30	2.333	2.09	3.33	0.61
0.417	0.93	1.417	26.45	2.417	1.60	3.42	0.52
0.500	0.93	1.500	26.45	2.500	1.60	3.50	0.52
0.583	1.43	1.583	11.48	2.583	1.26	3.58	0.46
0.667	1.43	1.667	11.48	2.667	1.26	3.67	0.46
0.750	2.46	1.750	6.42	2.750	1.02	3.75	0.40
0.833	2.46	1.833	6.42	2.833	1.02	3.83	0.40
0.917	5.25	1.917	4.10	2.917	0.85	3.92	0.35
1.000	5.25	2.000	4.10	3.000	0.85	4.00	0.35

Max.Eff.Inten.(mm/hr)=		77.30	10.09	
over (min)		5.00	25.00	
Storage Coeff. (min)=		3.53 (ii)	21.19 (ii)	
Unit Hyd. Tpeak (min)=		5.00	25.00	
Unit Hyd. peak (cms)=		0.26	0.05	
				TOTALS
PEAK FLOW	(cms)=	0.15	0.04	0.159 (iii)
TIME TO PEAK	(hrs)=	1.33	1.67	1.33
RUNOFF VOLUME	(mm)=	27.11	5.43	10.52
TOTAL RAINFALL	(mm)=	28.11	28.11	28.11
RUNOFF COEFFICIENT	=	0.96	0.19	0.37

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 71.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB
STANDHYD (0023) | Area (ha)= 0.50
ID= 1 DT= 5.0 min | Total Imp(%)= 28.20 Dir. Conn.(%)= 28.20

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.14	0.36
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	57.60	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.49	1.083	18.95	2.083	2.84	3.08	0.71
0.167	0.49	1.167	18.95	2.167	2.84	3.17	0.71
0.250	0.66	1.250	77.30	2.250	2.09	3.25	0.61
0.333	0.66	1.333	77.30	2.333	2.09	3.33	0.61
0.417	0.93	1.417	26.45	2.417	1.60	3.42	0.52
0.500	0.93	1.500	26.45	2.500	1.60	3.50	0.52
0.583	1.43	1.583	11.48	2.583	1.26	3.58	0.46
0.667	1.43	1.667	11.48	2.667	1.26	3.67	0.46
0.750	2.46	1.750	6.42	2.750	1.02	3.75	0.40
0.833	2.46	1.833	6.42	2.833	1.02	3.83	0.40
0.917	5.25	1.917	4.10	2.917	0.85	3.92	0.35
1.000	5.25	2.000	4.10	3.000	0.85	4.00	0.35

Max.Eff.Inten.(mm/hr)=		77.30	10.09	
over (min)		5.00	20.00	
Storage Coeff. (min)=		2.03 (ii)	19.70 (ii)	
Unit Hyd. Tpeak (min)=		5.00	20.00	
Unit Hyd. peak (cms)=		0.31	0.06	
				TOTALS
PEAK FLOW	(cms)=	0.03	0.01	0.032 (iii)
TIME TO PEAK	(hrs)=	1.33	1.67	1.33
RUNOFF VOLUME	(mm)=	27.11	5.43	11.52
TOTAL RAINFALL	(mm)=	28.11	28.11	28.11
RUNOFF COEFFICIENT	=	0.96	0.19	0.41

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 71.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB
STANDHYD (0024) | Area (ha)= 0.53
ID= 1 DT= 5.0 min | Total Imp(%)= 34.09 Dir. Conn.(%)= 34.09

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.18	0.35
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	59.35	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.49	1.083	18.95	2.083	2.84	3.08	0.71
0.167	0.49	1.167	18.95	2.167	2.84	3.17	0.71
0.250	0.66	1.250	77.30	2.250	2.09	3.25	0.61
0.333	0.66	1.333	77.30	2.333	2.09	3.33	0.61
0.417	0.93	1.417	26.45	2.417	1.60	3.42	0.52
0.500	0.93	1.500	26.45	2.500	1.60	3.50	0.52
0.583	1.43	1.583	11.48	2.583	1.26	3.58	0.46
0.667	1.43	1.667	11.48	2.667	1.26	3.67	0.46
0.750	2.46	1.750	6.42	2.750	1.02	3.75	0.40
0.833	2.46	1.833	6.42	2.833	1.02	3.83	0.40
0.917	5.25	1.917	4.10	2.917	0.85	3.92	0.35
1.000	5.25	2.000	4.10	3.000	0.85	4.00	0.35

Max.Eff.Inten.(mm/hr)=		77.30	10.09	
over (min)		5.00	20.00	
Storage Coeff. (min)=		2.07 (ii)	19.73 (ii)	
Unit Hyd. Tpeak (min)=		5.00	20.00	
Unit Hyd. peak (cms)=		0.31	0.06	
				TOTALS
PEAK FLOW	(cms)=	0.04	0.01	0.040 (iii)
TIME TO PEAK	(hrs)=	1.33	1.67	1.33
RUNOFF VOLUME	(mm)=	27.11	5.43	12.79
TOTAL RAINFALL	(mm)=	28.11	28.11	28.11
RUNOFF COEFFICIENT	=	0.96	0.19	0.46

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 71.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB
STANDHYD (0025) | Area (ha)= 0.26
ID= 1 DT= 5.0 min | Total Imp(%)= 37.90 Dir. Conn.(%)= 37.90

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.10	0.16
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	41.50	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.49	1.083	18.95	2.083	2.84	3.08	0.71

0.167	0.49	1.167	18.95	2.167	2.84	3.17	0.71
0.250	0.66	1.250	77.30	2.250	2.09	3.25	0.61
0.333	0.66	1.333	77.30	2.333	2.09	3.33	0.61
0.417	0.93	1.417	26.45	2.417	1.60	3.42	0.52
0.500	0.93	1.500	26.45	2.500	1.60	3.50	0.52
0.583	1.43	1.583	11.48	2.583	1.26	3.58	0.46
0.667	1.43	1.667	11.48	2.667	1.26	3.67	0.46
0.750	2.46	1.750	6.42	2.750	1.02	3.75	0.40
0.833	2.46	1.833	6.42	2.833	1.02	3.83	0.40
0.917	5.25	1.917	4.10	2.917	0.85	3.92	0.35
1.000	5.25	2.000	4.10	3.000	0.85	4.00	0.35

Max.Eff.Inten.(mm/hr)=		77.30	10.09	
over (min)		5.00	20.00	
Storage Coeff. (min)=		1.67 (ii)	19.33 (ii)	
Unit Hyd. Tpeak (min)=		5.00	20.00	
Unit Hyd. peak (cms)=		0.32	0.06	
				TOTALS
PEAK FLOW	(cms)=	0.02	0.00	0.022 (iii)
TIME TO PEAK	(hrs)=	1.33	1.67	1.33
RUNOFF VOLUME	(mm)=	27.11	5.43	13.60
TOTAL RAINFALL	(mm)=	28.11	28.11	28.11
RUNOFF COEFFICIENT	=	0.96	0.19	0.48

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 71.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB			
STANDHYD (0026)	Area (ha)=	0.73	
ID= 1 DT= 5.0 min	Total Imp(%)=	36.77	Dir. Conn.(%)= 36.77

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.27	0.46
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	69.58	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.49	1.083	18.95	2.083	2.84	3.08	0.71
0.167	0.49	1.167	18.95	2.167	2.84	3.17	0.71
0.250	0.66	1.250	77.30	2.250	2.09	3.25	0.61
0.333	0.66	1.333	77.30	2.333	2.09	3.33	0.61
0.417	0.93	1.417	26.45	2.417	1.60	3.42	0.52
0.500	0.93	1.500	26.45	2.500	1.60	3.50	0.52
0.583	1.43	1.583	11.48	2.583	1.26	3.58	0.46
0.667	1.43	1.667	11.48	2.667	1.26	3.67	0.46
0.750	2.46	1.750	6.42	2.750	1.02	3.75	0.40
0.833	2.46	1.833	6.42	2.833	1.02	3.83	0.40
0.917	5.25	1.917	4.10	2.917	0.85	3.92	0.35
1.000	5.25	2.000	4.10	3.000	0.85	4.00	0.35

Max.Eff.Inten.(mm/hr)=		77.30	10.09	
over (min)		5.00	20.00	
Storage Coeff. (min)=		2.28 (ii)	19.94 (ii)	
Unit Hyd. Tpeak (min)=		5.00	20.00	
Unit Hyd. peak (cms)=		0.30	0.06	
				TOTALS
PEAK FLOW	(cms)=	0.06	0.01	0.059 (iii)
TIME TO PEAK	(hrs)=	1.33	1.67	1.33
RUNOFF VOLUME	(mm)=	27.11	5.43	13.39
TOTAL RAINFALL	(mm)=	28.11	28.11	28.11
RUNOFF COEFFICIENT	=	0.96	0.19	0.48

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 71.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

****
** SIMULATION:2) 5-Year **
****

CALIB			
STANDHYD (0019)	Area (ha)=	2.21	
ID= 1 DT= 5.0 min	Total Imp(%)=	6.87	Dir. Conn.(%)= 6.87

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.15	2.06
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	121.48	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.81	1.083	27.06	2.083	4.54	3.08	1.17
0.167	0.81	1.167	27.06	2.167	4.54	3.17	1.17
0.250	1.09	1.250	94.77	2.250	3.37	3.25	1.00
0.333	1.09	1.333	94.77	2.333	3.37	3.33	1.00
0.417	1.53	1.417	36.99	2.417	2.60	3.42	0.87
0.500	1.53	1.500	36.99	2.500	2.60	3.50	0.87
0.583	2.32	1.583	17.18	2.583	2.06	3.58	0.76
0.667	2.32	1.667	17.18	2.667	2.06	3.67	0.76
0.750	3.95	1.750	9.92	2.750	1.68	3.75	0.67
0.833	3.95	1.833	9.92	2.833	1.68	3.83	0.67
0.917	8.18	1.917	6.46	2.917	1.39	3.92	0.59
1.000	8.18	2.000	6.46	3.000	1.39	4.00	0.59

Max.Eff.Inten.(mm/hr)=		94.77	17.92	
over (min)		5.00	20.00	
Storage Coeff. (min)=		2.93 (ii)	16.97 (ii)	
Unit Hyd. Tpeak (min)=		5.00	20.00	
Unit Hyd. peak (cms)=		0.28	0.06	
				TOTALS
PEAK FLOW	(cms)=	0.04	0.06	0.069 (iii)
TIME TO PEAK	(hrs)=	1.33	1.58	1.58
RUNOFF VOLUME	(mm)=	37.49	9.72	11.63
TOTAL RAINFALL	(mm)=	38.49	38.49	38.49
RUNOFF COEFFICIENT	=	0.97	0.25	0.30

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
YOU SHOULD CONSIDER SPLITTING THE AREA.

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 71.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB			
STANDHYD (0020)	Area (ha)=	0.09	
ID= 1 DT= 5.0 min	Total Imp(%)=	36.36	Dir. Conn.(%)= 36.36

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.03	0.05
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	23.84	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.81	1.083	27.06	2.083	4.54	3.08	1.17
0.167	0.81	1.167	27.06	2.167	4.54	3.17	1.17
0.250	1.09	1.250	94.77	2.250	3.37	3.25	1.00
0.333	1.09	1.333	94.77	2.333	3.37	3.33	1.00
0.417	1.53	1.417	36.99	2.417	2.60	3.42	0.87
0.500	1.53	1.500	36.99	2.500	2.60	3.50	0.87
0.583	2.32	1.583	17.18	2.583	2.06	3.58	0.76
0.667	2.32	1.667	17.18	2.667	2.06	3.67	0.76

0.750	3.95	1.750	9.92	2.750	1.68	3.75	0.67
0.833	3.95	1.833	9.92	2.833	1.68	3.83	0.67
0.917	8.18	1.917	6.46	2.917	1.39	3.92	0.59
1.000	8.18	2.000	6.46	3.000	1.39	4.00	0.59

Max.Eff.Inten.(mm/hr)=		94.77	17.92	
over (min)		5.00	20.00	
Storage Coeff. (min)=		1.10 (ii)	15.14 (ii)	
Unit Hyd. Tpeak (min)=		5.00	20.00	
Unit Hyd. peak (cms)=		0.34	0.07	
				TOTALS
PEAK FLOW	(cms)=	0.01	0.00	0.009 (iii)
TIME TO PEAK	(hrs)=	1.33	1.58	1.33
RUNOFF VOLUME	(mm)=	37.49	9.72	19.75
TOTAL RAINFALL	(mm)=	38.49	38.49	38.49
RUNOFF COEFFICIENT	=	0.97	0.25	0.51

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 71.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB			
STANDHYD (0021)	Area	(ha)=	2.59
ID= 1 DT= 5.0 min	Total Imp(%)=	21.41	Dir. Conn.(%)= 21.41

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.56	2.04
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	131.48	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.81	1.083	27.06	2.083	4.54	3.08	1.17
0.167	0.81	1.167	27.06	2.167	4.54	3.17	1.17
0.250	1.09	1.250	94.77	2.250	3.37	3.25	1.00
0.333	1.09	1.333	94.77	2.333	3.37	3.33	1.00
0.417	1.53	1.417	36.99	2.417	2.60	3.42	0.87
0.500	1.53	1.500	36.99	2.500	2.60	3.50	0.87
0.583	2.32	1.583	17.18	2.583	2.06	3.58	0.76
0.667	2.32	1.667	17.18	2.667	2.06	3.67	0.76
0.750	3.95	1.750	9.92	2.750	1.68	3.75	0.67
0.833	3.95	1.833	9.92	2.833	1.68	3.83	0.67
0.917	8.18	1.917	6.46	2.917	1.39	3.92	0.59
1.000	8.18	2.000	6.46	3.000	1.39	4.00	0.59

Max.Eff.Inten.(mm/hr)=		94.77	17.92	
over (min)		5.00	20.00	
Storage Coeff. (min)=		3.08 (ii)	17.11 (ii)	
Unit Hyd. Tpeak (min)=		5.00	20.00	
Unit Hyd. peak (cms)=		0.27	0.06	
				TOTALS
PEAK FLOW	(cms)=	0.14	0.06	0.160 (iii)
TIME TO PEAK	(hrs)=	1.33	1.58	1.33
RUNOFF VOLUME	(mm)=	37.49	9.72	15.67
TOTAL RAINFALL	(mm)=	38.49	38.49	38.49
RUNOFF COEFFICIENT	=	0.97	0.25	0.41

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 71.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB			
STANDHYD (0022)	Area	(ha)=	3.13
ID= 1 DT= 5.0 min	Total Imp(%)=	23.51	Dir. Conn.(%)= 23.51

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.74	2.39
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	144.41	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.81	1.083	27.06	2.083	4.54	3.08	1.17
0.167	0.81	1.167	27.06	2.167	4.54	3.17	1.17
0.250	1.09	1.250	94.77	2.250	3.37	3.25	1.00
0.333	1.09	1.333	94.77	2.333	3.37	3.33	1.00
0.417	1.53	1.417	36.99	2.417	2.60	3.42	0.87
0.500	1.53	1.500	36.99	2.500	2.60	3.50	0.87
0.583	2.32	1.583	17.18	2.583	2.06	3.58	0.76
0.667	2.32	1.667	17.18	2.667	2.06	3.67	0.76
0.750	3.95	1.750	9.92	2.750	1.68	3.75	0.67
0.833	3.95	1.833	9.92	2.833	1.68	3.83	0.67
0.917	8.18	1.917	6.46	2.917	1.39	3.92	0.59
1.000	8.18	2.000	6.46	3.000	1.39	4.00	0.59

Max.Eff.Inten.(mm/hr)=		94.77	17.92	
over (min)		5.00	20.00	
Storage Coeff. (min)=		3.25 (ii)	17.29 (ii)	
Unit Hyd. Tpeak (min)=		5.00	20.00	
Unit Hyd. peak (cms)=		0.27	0.06	
				TOTALS
PEAK FLOW	(cms)=	0.19	0.07	0.208 (iii)
TIME TO PEAK	(hrs)=	1.33	1.58	1.33
RUNOFF VOLUME	(mm)=	37.49	9.72	16.25
TOTAL RAINFALL	(mm)=	38.49	38.49	38.49
RUNOFF COEFFICIENT	=	0.97	0.25	0.42

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 71.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB			
STANDHYD (0023)	Area	(ha)=	0.50
ID= 1 DT= 5.0 min	Total Imp(%)=	28.20	Dir. Conn.(%)= 28.20

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.14	0.36
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	57.60	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.81	1.083	27.06	2.083	4.54	3.08	1.17
0.167	0.81	1.167	27.06	2.167	4.54	3.17	1.17
0.250	1.09	1.250	94.77	2.250	3.37	3.25	1.00
0.333	1.09	1.333	94.77	2.333	3.37	3.33	1.00
0.417	1.53	1.417	36.99	2.417	2.60	3.42	0.87
0.500	1.53	1.500	36.99	2.500	2.60	3.50	0.87
0.583	2.32	1.583	17.18	2.583	2.06	3.58	0.76
0.667	2.32	1.667	17.18	2.667	2.06	3.67	0.76
0.750	3.95	1.750	9.92	2.750	1.68	3.75	0.67
0.833	3.95	1.833	9.92	2.833	1.68	3.83	0.67
0.917	8.18	1.917	6.46	2.917	1.39	3.92	0.59
1.000	8.18	2.000	6.46	3.000	1.39	4.00	0.59

Max.Eff.Inten.(mm/hr)=		94.77	17.92	
over (min)		5.00	20.00	
Storage Coeff. (min)=		1.87 (ii)	15.91 (ii)	
Unit Hyd. Tpeak (min)=		5.00	20.00	
Unit Hyd. peak (cms)=		0.32	0.07	
				TOTALS
PEAK FLOW	(cms)=	0.04	0.01	0.040 (iii)

```
     TIME TO PEAK    (hrs)=       1.33          1.58          1.33
     RUNOFF VOLUME    (mm)=      37.49          9.72         17.53
     TOTAL RAINFALL   (mm)=      38.49         38.49         38.49
     RUNOFF COEFFICIENT   =       0.97          0.25          0.46

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
             CN*  =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB            |
| STANDHYD (  0024)|   Area    (ha)=   0.53
|ID= 1 DT= 5.0 min |   Total Imp(%)=  34.09   Dir. Conn.(%)=  34.09
--------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.18          0.35
     Dep. Storage     (mm)=       1.00          1.50
     Average Slope     (%)=       1.00          2.00
     Length            (m)=      59.35         40.00
     Mannings n            =      0.013         0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                        ---- TRANSFORMED HYETOGRAPH ----
               TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
              0.083    0.81 | 1.083   27.06 | 2.083    4.54 |  3.08    1.17
              0.167    0.81 | 1.167   27.06 | 2.167    4.54 |  3.17    1.17
              0.250    1.09 | 1.250   94.77 | 2.250    3.37 |  3.25    1.00
              0.333    1.09 | 1.333   94.77 | 2.333    3.37 |  3.33    1.00
              0.417    1.53 | 1.417   36.99 | 2.417    2.60 |  3.42    0.87
              0.500    1.53 | 1.500   36.99 | 2.500    2.60 |  3.50    0.87
              0.583    2.32 | 1.583   17.18 | 2.583    2.06 |  3.58    0.76
              0.667    2.32 | 1.667   17.18 | 2.667    2.06 |  3.67    0.76
              0.750    3.95 | 1.750    9.92 | 2.750    1.68 |  3.75    0.67
              0.833    3.95 | 1.833    9.92 | 2.833    1.68 |  3.83    0.67
              0.917    8.18 | 1.917    6.46 | 2.917    1.39 |  3.92    0.59
              1.000    8.18 | 2.000    6.46 | 3.000    1.39 |  4.00    0.59

     Max.Eff.Inten.(mm/hr)=      94.77         17.92
               over (min)        5.00         20.00
     Storage Coeff.  (min)=      1.91 (ii)    15.95 (ii)
     Unit Hyd. Tpeak (min)=      5.00         20.00
     Unit Hyd. peak  (cms)=      0.32          0.07
                                                    *TOTALS*
     PEAK FLOW       (cms)=      0.05          0.01          0.050 (iii)
     TIME TO PEAK    (hrs)=      1.33          1.58          1.33
     RUNOFF VOLUME    (mm)=     37.49          9.72         19.17
     TOTAL RAINFALL   (mm)=     38.49         38.49         38.49
     RUNOFF COEFFICIENT   =      0.97          0.25          0.50

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
             CN*  =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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| CALIB            |
| STANDHYD (  0025)|   Area    (ha)=   0.26
|ID= 1 DT= 5.0 min |   Total Imp(%)=  37.90   Dir. Conn.(%)=  37.90
--------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.10          0.16
     Dep. Storage     (mm)=       1.00          1.50
     Average Slope     (%)=       1.00          2.00
     Length            (m)=      41.50         40.00
     Mannings n            =      0.013         0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                        ---- TRANSFORMED HYETOGRAPH ----
               TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
              0.083    0.81 | 1.083   27.06 | 2.083    4.54 |  3.08    1.17
              0.167    0.81 | 1.167   27.06 | 2.167    4.54 |  3.17    1.17
              0.250    1.09 | 1.250   94.77 | 2.250    3.37 |  3.25    1.00
              0.333    1.09 | 1.333   94.77 | 2.333    3.37 |  3.33    1.00
              0.417    1.53 | 1.417   36.99 | 2.417    2.60 |  3.42    0.87
              0.500    1.53 | 1.500   36.99 | 2.500    2.60 |  3.50    0.87
              0.583    2.32 | 1.583   17.18 | 2.583    2.06 |  3.58    0.76
              0.667    2.32 | 1.667   17.18 | 2.667    2.06 |  3.67    0.76
              0.750    3.95 | 1.750    9.92 | 2.750    1.68 |  3.75    0.67
              0.833    3.95 | 1.833    9.92 | 2.833    1.68 |  3.83    0.67
              0.917    8.18 | 1.917    6.46 | 2.917    1.39 |  3.92    0.59
              1.000    8.18 | 2.000    6.46 | 3.000    1.39 |  4.00    0.59

     Max.Eff.Inten.(mm/hr)=      94.77         17.92
               over (min)        5.00         20.00
     Storage Coeff.  (min)=      1.54 (ii)    15.58 (ii)
     Unit Hyd. Tpeak (min)=      5.00         20.00
     Unit Hyd. peak  (cms)=      0.33          0.07
                                                    *TOTALS*
     PEAK FLOW       (cms)=      0.03          0.00          0.027 (iii)
     TIME TO PEAK    (hrs)=      1.33          1.58          1.33
     RUNOFF VOLUME    (mm)=     37.49          9.72         20.22
     TOTAL RAINFALL   (mm)=     38.49         38.49         38.49
     RUNOFF COEFFICIENT   =      0.97          0.25          0.53

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
             CN*  =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB            |
| STANDHYD (  0026)|   Area    (ha)=   0.73
|ID= 1 DT= 5.0 min |   Total Imp(%)=  36.77   Dir. Conn.(%)=  36.77
--------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.27          0.46
     Dep. Storage     (mm)=       1.00          1.50
     Average Slope     (%)=       1.00          2.00
     Length            (m)=      69.58         40.00
     Mannings n            =      0.013         0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                        ---- TRANSFORMED HYETOGRAPH ----
               TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
              0.083    0.81 | 1.083   27.06 | 2.083    4.54 |  3.08    1.17
              0.167    0.81 | 1.167   27.06 | 2.167    4.54 |  3.17    1.17
              0.250    1.09 | 1.250   94.77 | 2.250    3.37 |  3.25    1.00
              0.333    1.09 | 1.333   94.77 | 2.333    3.37 |  3.33    1.00
              0.417    1.53 | 1.417   36.99 | 2.417    2.60 |  3.42    0.87
              0.500    1.53 | 1.500   36.99 | 2.500    2.60 |  3.50    0.87
              0.583    2.32 | 1.583   17.18 | 2.583    2.06 |  3.58    0.76
              0.667    2.32 | 1.667   17.18 | 2.667    2.06 |  3.67    0.76
              0.750    3.95 | 1.750    9.92 | 2.750    1.68 |  3.75    0.67
              0.833    3.95 | 1.833    9.92 | 2.833    1.68 |  3.83    0.67
              0.917    8.18 | 1.917    6.46 | 2.917    1.39 |  3.92    0.59
              1.000    8.18 | 2.000    6.46 | 3.000    1.39 |  4.00    0.59

     Max.Eff.Inten.(mm/hr)=      94.77         17.92
               over (min)        5.00         20.00
     Storage Coeff.  (min)=      2.10 (ii)    16.14 (ii)
     Unit Hyd. Tpeak (min)=      5.00         20.00
     Unit Hyd. peak  (cms)=      0.31          0.06
                                                    *TOTALS*
     PEAK FLOW       (cms)=      0.07          0.01          0.074 (iii)
     TIME TO PEAK    (hrs)=      1.33          1.58          1.33
     RUNOFF VOLUME    (mm)=     37.49          9.72         19.92
     TOTAL RAINFALL   (mm)=     38.49         38.49         38.49
     RUNOFF COEFFICIENT   =      0.97          0.25          0.52

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
             CN*  =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
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**********************************
** SIMULATION:3) 10-Year      **
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| CALIB            |
| STANDHYD (  0019)|   Area    (ha)=   2.21
|ID= 1 DT= 5.0 min |   Total Imp(%)=   6.87   Dir. Conn.(%)=   6.87
--------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.15          2.06
     Dep. Storage     (mm)=       1.00          1.50
     Average Slope     (%)=       1.00          2.00
     Length            (m)=     121.48         40.00
     Mannings n            =      0.013         0.250

        NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                          ---- TRANSFORMED HYETOGRAPH ----
     TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
      hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
    0.083    0.93 | 1.083   30.96 | 2.083    5.20 |  3.08    1.34
    0.167    0.93 | 1.167   30.96 | 2.167    5.20 |  3.17    1.34
    0.250    1.24 | 1.250  108.42 | 2.250    3.85 |  3.25    1.15
    0.333    1.24 | 1.333  108.42 | 2.333    3.85 |  3.33    1.15
    0.417    1.75 | 1.417   42.32 | 2.417    2.97 |  3.42    0.99
    0.500    1.75 | 1.500   42.32 | 2.500    2.97 |  3.50    0.99
    0.583    2.66 | 1.583   19.65 | 2.583    2.36 |  3.58    0.87
    0.667    2.66 | 1.667   19.65 | 2.667    2.36 |  3.67    0.87
    0.750    4.51 | 1.750   11.35 | 2.750    1.92 |  3.75    0.76
    0.833    4.51 | 1.833   11.35 | 2.833    1.92 |  3.83    0.76
    0.917    9.35 | 1.917    7.39 | 2.917    1.59 |  3.92    0.68
    1.000    9.35 | 2.000    7.39 | 3.000    1.59 |  4.00    0.68

     Max.Eff.Inten.(mm/hr)=     108.42        23.02
               over (min)        5.00        20.00
     Storage Coeff.  (min)=       2.78 (ii)   15.48 (ii)
     Unit Hyd. Tpeak (min)=       5.00        20.00
     Unit Hyd. peak  (cms)=       0.28         0.07
                                                    *TOTALS*
     PEAK FLOW       (cms)=       0.04         0.08          0.091 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.58           1.58
     RUNOFF VOLUME    (mm)=      43.04        12.37          14.47
     TOTAL RAINFALL   (mm)=      44.04        44.04          44.04
     RUNOFF COEFFICIENT   =       0.98         0.28           0.33

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
             YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
             CN*  =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB            |
| STANDHYD (  0020)|   Area    (ha)=   0.09
|ID= 1 DT= 5.0 min |   Total Imp(%)=  36.36   Dir. Conn.(%)=  36.36
--------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.03          0.05
     Dep. Storage     (mm)=       1.00          1.50
     Average Slope     (%)=       1.00          2.00
     Length            (m)=      23.84         40.00
     Mannings n            =      0.013         0.250

        NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                          ---- TRANSFORMED HYETOGRAPH ----
     TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
      hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
    0.083    0.93 | 1.083   30.96 | 2.083    5.20 |  3.08    1.34
    0.167    0.93 | 1.167   30.96 | 2.167    5.20 |  3.17    1.34
    0.250    1.24 | 1.250  108.42 | 2.250    3.85 |  3.25    1.15
    0.333    1.24 | 1.333  108.42 | 2.333    3.85 |  3.33    1.15
    0.417    1.75 | 1.417   42.32 | 2.417    2.97 |  3.42    0.99
    0.500    1.75 | 1.500   42.32 | 2.500    2.97 |  3.50    0.99
    0.583    2.66 | 1.583   19.65 | 2.583    2.36 |  3.58    0.87
    0.667    2.66 | 1.667   19.65 | 2.667    2.36 |  3.67    0.87
    0.750    4.51 | 1.750   11.35 | 2.750    1.92 |  3.75    0.76
    0.833    4.51 | 1.833   11.35 | 2.833    1.92 |  3.83    0.76
    0.917    9.35 | 1.917    7.39 | 2.917    1.59 |  3.92    0.68
    1.000    9.35 | 2.000    7.39 | 3.000    1.59 |  4.00    0.68

     Max.Eff.Inten.(mm/hr)=     108.42        23.02
               over (min)        5.00        15.00
     Storage Coeff.  (min)=       1.05 (ii)   13.75 (ii)
     Unit Hyd. Tpeak (min)=       5.00        15.00
     Unit Hyd. peak  (cms)=       0.34         0.08
                                                    *TOTALS*
     PEAK FLOW       (cms)=       0.01         0.00          0.010 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.50           1.33
     RUNOFF VOLUME    (mm)=      43.04        12.37          23.45
     TOTAL RAINFALL   (mm)=      44.04        44.04          44.04
     RUNOFF COEFFICIENT   =       0.98         0.28           0.53

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
             CN*  =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB            |
| STANDHYD (  0021)|   Area    (ha)=   2.59
|ID= 1 DT= 5.0 min |   Total Imp(%)=  21.41   Dir. Conn.(%)=  21.41
--------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.56          2.04
     Dep. Storage     (mm)=       1.00          1.50
     Average Slope     (%)=       1.00          2.00
     Length            (m)=     131.48         40.00
     Mannings n            =      0.013         0.250

        NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                          ---- TRANSFORMED HYETOGRAPH ----
     TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
      hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
    0.083    0.93 | 1.083   30.96 | 2.083    5.20 |  3.08    1.34
    0.167    0.93 | 1.167   30.96 | 2.167    5.20 |  3.17    1.34
    0.250    1.24 | 1.250  108.42 | 2.250    3.85 |  3.25    1.15
    0.333    1.24 | 1.333  108.42 | 2.333    3.85 |  3.33    1.15
    0.417    1.75 | 1.417   42.32 | 2.417    2.97 |  3.42    0.99
    0.500    1.75 | 1.500   42.32 | 2.500    2.97 |  3.50    0.99
    0.583    2.66 | 1.583   19.65 | 2.583    2.36 |  3.58    0.87
    0.667    2.66 | 1.667   19.65 | 2.667    2.36 |  3.67    0.87
    0.750    4.51 | 1.750   11.35 | 2.750    1.92 |  3.75    0.76
    0.833    4.51 | 1.833   11.35 | 2.833    1.92 |  3.83    0.76
    0.917    9.35 | 1.917    7.39 | 2.917    1.59 |  3.92    0.68
    1.000    9.35 | 2.000    7.39 | 3.000    1.59 |  4.00    0.68

     Max.Eff.Inten.(mm/hr)=     108.42        23.02
               over (min)        5.00        20.00
     Storage Coeff.  (min)=       2.91 (ii)   15.62 (ii)
     Unit Hyd. Tpeak (min)=       5.00        20.00
     Unit Hyd. peak  (cms)=       0.28         0.07
                                                    *TOTALS*
     PEAK FLOW       (cms)=       0.16         0.08          0.189 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.58           1.33
     RUNOFF VOLUME    (mm)=      43.04        12.37          18.93
     TOTAL RAINFALL   (mm)=      44.04        44.04          44.04
     RUNOFF COEFFICIENT   =       0.98         0.28           0.43

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
             CN*  =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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| CALIB            |
| STANDHYD (  0022)|   Area    (ha)=   3.13
|ID= 1 DT= 5.0 min |   Total Imp(%)=  23.51   Dir. Conn.(%)=  23.51
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		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.74	2.39
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	144.41	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.93	1.083	30.96	2.083	5.20	3.08	1.34
0.167	0.93	1.167	30.96	2.167	5.20	3.17	1.34
0.250	1.24	1.250	108.42	2.250	3.85	3.25	1.15
0.333	1.24	1.333	108.42	2.333	3.85	3.33	1.15
0.417	1.75	1.417	42.32	2.417	2.97	3.42	0.99
0.500	1.75	1.500	42.32	2.500	2.97	3.50	0.99
0.583	2.66	1.583	19.65	2.583	2.36	3.58	0.87
0.667	2.66	1.667	19.65	2.667	2.36	3.67	0.87
0.750	4.51	1.750	11.35	2.750	1.92	3.75	0.76
0.833	4.51	1.833	11.35	2.833	1.92	3.83	0.76
0.917	9.35	1.917	7.39	2.917	1.59	3.92	0.68
1.000	9.35	2.000	7.39	3.000	1.59	4.00	0.68

Max.Eff.Inten.	(mm/hr)=	108.42	23.02	
over	(min)	5.00	20.00	
Storage Coeff.	(min)=	3.08 (ii)	15.78 (ii)	
Unit Hyd. Tpeak	(min)=	5.00	20.00	
Unit Hyd. peak	(cms)=	0.27	0.07	
				TOTALS
PEAK FLOW	(cms)=	0.22	0.09	0.245 (iii)
TIME TO PEAK	(hrs)=	1.33	1.58	1.33
RUNOFF VOLUME	(mm)=	43.04	12.37	19.58
TOTAL RAINFALL	(mm)=	44.04	44.04	44.04
RUNOFF COEFFICIENT	=	0.98	0.28	0.44

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 71.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB	
STANDHYD (0023)	Area (ha)= 0.50
ID= 1 DT= 5.0 min	Total Imp(%)= 28.20 Dir. Conn.(%)= 28.20

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.14	0.36
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	57.60	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.93	1.083	30.96	2.083	5.20	3.08	1.34
0.167	0.93	1.167	30.96	2.167	5.20	3.17	1.34
0.250	1.24	1.250	108.42	2.250	3.85	3.25	1.15
0.333	1.24	1.333	108.42	2.333	3.85	3.33	1.15
0.417	1.75	1.417	42.32	2.417	2.97	3.42	0.99
0.500	1.75	1.500	42.32	2.500	2.97	3.50	0.99
0.583	2.66	1.583	19.65	2.583	2.36	3.58	0.87
0.667	2.66	1.667	19.65	2.667	2.36	3.67	0.87
0.750	4.51	1.750	11.35	2.750	1.92	3.75	0.76
0.833	4.51	1.833	11.35	2.833	1.92	3.83	0.76
0.917	9.35	1.917	7.39	2.917	1.59	3.92	0.68
1.000	9.35	2.000	7.39	3.000	1.59	4.00	0.68

Max.Eff.Inten.	(mm/hr)=	108.42	23.02	
over	(min)	5.00	15.00	
Storage Coeff.	(min)=	1.78 (ii)	14.48 (ii)	
Unit Hyd. Tpeak	(min)=	5.00	15.00	
Unit Hyd. peak	(cms)=	0.32	0.08	
				TOTALS
PEAK FLOW	(cms)=	0.04	0.01	0.049 (iii)
TIME TO PEAK	(hrs)=	1.33	1.50	1.33
RUNOFF VOLUME	(mm)=	43.04	12.37	21.00
TOTAL RAINFALL	(mm)=	44.04	44.04	44.04
RUNOFF COEFFICIENT	=	0.98	0.28	0.48

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 71.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB	
STANDHYD (0024)	Area (ha)= 0.53
ID= 1 DT= 5.0 min	Total Imp(%)= 34.09 Dir. Conn.(%)= 34.09

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.18	0.35
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	59.35	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.93	1.083	30.96	2.083	5.20	3.08	1.34
0.167	0.93	1.167	30.96	2.167	5.20	3.17	1.34
0.250	1.24	1.250	108.42	2.250	3.85	3.25	1.15
0.333	1.24	1.333	108.42	2.333	3.85	3.33	1.15
0.417	1.75	1.417	42.32	2.417	2.97	3.42	0.99
0.500	1.75	1.500	42.32	2.500	2.97	3.50	0.99
0.583	2.66	1.583	19.65	2.583	2.36	3.58	0.87
0.667	2.66	1.667	19.65	2.667	2.36	3.67	0.87
0.750	4.51	1.750	11.35	2.750	1.92	3.75	0.76
0.833	4.51	1.833	11.35	2.833	1.92	3.83	0.76
0.917	9.35	1.917	7.39	2.917	1.59	3.92	0.68
1.000	9.35	2.000	7.39	3.000	1.59	4.00	0.68

Max.Eff.Inten.	(mm/hr)=	108.42	23.02	
over	(min)	5.00	15.00	
Storage Coeff.	(min)=	1.81 (ii)	14.51 (ii)	
Unit Hyd. Tpeak	(min)=	5.00	15.00	
Unit Hyd. peak	(cms)=	0.32	0.08	
				TOTALS
PEAK FLOW	(cms)=	0.05	0.01	0.060 (iii)
TIME TO PEAK	(hrs)=	1.33	1.50	1.33
RUNOFF VOLUME	(mm)=	43.04	12.37	22.81
TOTAL RAINFALL	(mm)=	44.04	44.04	44.04
RUNOFF COEFFICIENT	=	0.98	0.28	0.52

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 71.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB	
STANDHYD (0025)	Area (ha)= 0.26
ID= 1 DT= 5.0 min	Total Imp(%)= 37.90 Dir. Conn.(%)= 37.90

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.10	0.16
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	41.50	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME	RAIN	TIME	RAIN	TIME	RAIN	TIME	RAIN

hrs	mm/hr	hrs	mm/hr	hrs	mm/hr	hrs	mm/hr
0.083	0.93	1.083	30.96	2.083	5.20	3.08	1.34
0.167	0.93	1.167	30.96	2.167	5.20	3.17	1.34
0.250	1.24	1.250	108.42	2.250	3.85	3.25	1.15
0.333	1.24	1.333	108.42	2.333	3.85	3.33	1.15
0.417	1.75	1.417	42.32	2.417	2.97	3.42	0.99
0.500	1.75	1.500	42.32	2.500	2.97	3.50	0.99
0.583	2.66	1.583	19.65	2.583	2.36	3.58	0.87
0.667	2.66	1.667	19.65	2.667	2.36	3.67	0.87
0.750	4.51	1.750	11.35	2.750	1.92	3.75	0.76
0.833	4.51	1.833	11.35	2.833	1.92	3.83	0.76
0.917	9.35	1.917	7.39	2.917	1.59	3.92	0.68
1.000	9.35	2.000	7.39	3.000	1.59	4.00	0.68

Max.Eff.Inten.(mm/hr)=		108.42	23.02	
over (min)		5.00	15.00	
Storage Coeff. (min)=		1.46 (ii)	14.16 (ii)	
Unit Hyd. Tpeak (min)=		5.00	15.00	
Unit Hyd. peak (cms)=		0.33	0.08	
				TOTALS
PEAK FLOW	(cms)=	0.03	0.01	0.032 (iii)
TIME TO PEAK	(hrs)=	1.33	1.50	1.33
RUNOFF VOLUME	(mm)=	43.04	12.37	23.96
TOTAL RAINFALL	(mm)=	44.04	44.04	44.04
RUNOFF COEFFICIENT	=	0.98	0.28	0.54

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 71.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB			
STANDHYD (0026)	Area (ha)=	0.73	
ID= 1 DT= 5.0 min	Total Imp(%)=	36.77	Dir. Conn.(%)= 36.77

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.27	0.46
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	69.58	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.93	1.083	30.96	2.083	5.20	3.08	1.34
0.167	0.93	1.167	30.96	2.167	5.20	3.17	1.34
0.250	1.24	1.250	108.42	2.250	3.85	3.25	1.15
0.333	1.24	1.333	108.42	2.333	3.85	3.33	1.15
0.417	1.75	1.417	42.32	2.417	2.97	3.42	0.99
0.500	1.75	1.500	42.32	2.500	2.97	3.50	0.99
0.583	2.66	1.583	19.65	2.583	2.36	3.58	0.87
0.667	2.66	1.667	19.65	2.667	2.36	3.67	0.87
0.750	4.51	1.750	11.35	2.750	1.92	3.75	0.76
0.833	4.51	1.833	11.35	2.833	1.92	3.83	0.76
0.917	9.35	1.917	7.39	2.917	1.59	3.92	0.68
1.000	9.35	2.000	7.39	3.000	1.59	4.00	0.68

Max.Eff.Inten.(mm/hr)=		108.42	23.02	
over (min)		5.00	15.00	
Storage Coeff. (min)=		1.99 (ii)	14.69 (ii)	
Unit Hyd. Tpeak (min)=		5.00	15.00	
Unit Hyd. peak (cms)=		0.31	0.08	
				TOTALS
PEAK FLOW	(cms)=	0.08	0.02	0.088 (iii)
TIME TO PEAK	(hrs)=	1.33	1.50	1.33
RUNOFF VOLUME	(mm)=	43.04	12.37	23.63
TOTAL RAINFALL	(mm)=	44.04	44.04	44.04
RUNOFF COEFFICIENT	=	0.98	0.28	0.54

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 71.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

****
** SIMULATION:4) 25-Year **
****

CALIB			
STANDHYD (0019)	Area (ha)=	2.21	
ID= 1 DT= 5.0 min	Total Imp(%)=	6.87	Dir. Conn.(%)= 6.87

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.15	2.06
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	121.48	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	1.41	1.083	43.05	2.083	7.72	3.08	2.04
0.167	1.41	1.167	43.05	2.167	7.72	3.17	2.04
0.250	1.89	1.250	138.79	2.250	5.76	3.25	1.74
0.333	1.89	1.333	138.79	2.333	5.76	3.33	1.74
0.417	2.65	1.417	58.11	2.417	4.46	3.42	1.51
0.500	2.65	1.500	58.11	2.500	4.46	3.50	1.51
0.583	4.00	1.583	28.06	2.583	3.56	3.58	1.32
0.667	4.00	1.667	28.06	2.667	3.56	3.67	1.32
0.750	6.73	1.750	16.53	2.750	2.90	3.75	1.16
0.833	6.73	1.833	16.53	2.833	2.90	3.83	1.16
0.917	13.69	1.917	10.90	2.917	2.41	3.92	1.03
1.000	13.69	2.000	10.90	3.000	2.41	4.00	1.03

Max.Eff.Inten.(mm/hr)=		138.79	43.97	
over (min)		5.00	15.00	
Storage Coeff. (min)=		2.52 (ii)	12.32 (ii)	
Unit Hyd. Tpeak (min)=		5.00	15.00	
Unit Hyd. peak (cms)=		0.29	0.08	
				TOTALS
PEAK FLOW	(cms)=	0.06	0.15	0.179 (iii)
TIME TO PEAK	(hrs)=	1.33	1.50	1.50
RUNOFF VOLUME	(mm)=	59.23	21.23	23.84
TOTAL RAINFALL	(mm)=	60.23	60.23	60.23
RUNOFF COEFFICIENT	=	0.98	0.35	0.40

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
YOU SHOULD CONSIDER SPLITTING THE AREA.

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 71.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB			
STANDHYD (0020)	Area (ha)=	0.09	
ID= 1 DT= 5.0 min	Total Imp(%)=	36.36	Dir. Conn.(%)= 36.36

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.03	0.05
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	23.84	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	1.41	1.083	43.05	2.083	7.72	3.08	2.04
0.167	1.41	1.167	43.05	2.167	7.72	3.17	2.04
0.250	1.89	1.250	138.79	2.250	5.76	3.25	1.74
0.333	1.89	1.333	138.79	2.333	5.76	3.33	1.74
0.417	2.65	1.417	58.11	2.417	4.46	3.42	1.51
0.500	2.65	1.500	58.11	2.500	4.46	3.50	1.51

0.583	4.00	1.583	28.06	2.583	3.56	3.58	1.32
0.667	4.00	1.667	28.06	2.667	3.56	3.67	1.32
0.750	6.73	1.750	16.53	2.750	2.90	3.75	1.16
0.833	6.73	1.833	16.53	2.833	2.90	3.83	1.16
0.917	13.69	1.917	10.90	2.917	2.41	3.92	1.03
1.000	13.69	2.000	10.90	3.000	2.41	4.00	1.03

Max.Eff.Inten.(mm/hr)=		138.79	43.97	
over (min)		5.00	15.00	
Storage Coeff. (min)=		0.95 (ii)	10.75 (ii)	
Unit Hyd. Tpeak (min)=		5.00	15.00	
Unit Hyd. peak (cms)=		0.34	0.09	
				TOTALS
PEAK FLOW	(cms)=	0.01	0.00	0.014 (iii)
TIME TO PEAK	(hrs)=	1.33	1.50	1.33
RUNOFF VOLUME	(mm)=	59.23	21.23	34.95
TOTAL RAINFALL	(mm)=	60.23	60.23	60.23
RUNOFF COEFFICIENT	=	0.98	0.35	0.58

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 71.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB			
STANDHYD (0021)	Area (ha)=	2.59	
ID= 1 DT= 5.0 min	Total Imp(%)=	21.41	Dir. Conn.(%)= 21.41

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.56	2.04
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	131.48	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	1.41	1.083	43.05	2.083	7.72	3.08	2.04
0.167	1.41	1.167	43.05	2.167	7.72	3.17	2.04
0.250	1.89	1.250	138.79	2.250	5.76	3.25	1.74
0.333	1.89	1.333	138.79	2.333	5.76	3.33	1.74
0.417	2.65	1.417	58.11	2.417	4.46	3.42	1.51
0.500	2.65	1.500	58.11	2.500	4.46	3.50	1.51
0.583	4.00	1.583	28.06	2.583	3.56	3.58	1.32
0.667	4.00	1.667	28.06	2.667	3.56	3.67	1.32
0.750	6.73	1.750	16.53	2.750	2.90	3.75	1.16
0.833	6.73	1.833	16.53	2.833	2.90	3.83	1.16
0.917	13.69	1.917	10.90	2.917	2.41	3.92	1.03
1.000	13.69	2.000	10.90	3.000	2.41	4.00	1.03

Max.Eff.Inten.(mm/hr)=		138.79	43.97	
over (min)		5.00	15.00	
Storage Coeff. (min)=		2.64 (ii)	12.45 (ii)	
Unit Hyd. Tpeak (min)=		5.00	15.00	
Unit Hyd. peak (cms)=		0.29	0.08	
				TOTALS
PEAK FLOW	(cms)=	0.21	0.15	0.282 (iii)
TIME TO PEAK	(hrs)=	1.33	1.50	1.33
RUNOFF VOLUME	(mm)=	59.23	21.23	29.37
TOTAL RAINFALL	(mm)=	60.23	60.23	60.23
RUNOFF COEFFICIENT	=	0.98	0.35	0.49

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 71.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB			
STANDHYD (0022)	Area (ha)=	3.13	
ID= 1 DT= 5.0 min	Total Imp(%)=	23.51	Dir. Conn.(%)= 23.51

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.74	2.39
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	144.41	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	1.41	1.083	43.05	2.083	7.72	3.08	2.04
0.167	1.41	1.167	43.05	2.167	7.72	3.17	2.04
0.250	1.89	1.250	138.79	2.250	5.76	3.25	1.74
0.333	1.89	1.333	138.79	2.333	5.76	3.33	1.74
0.417	2.65	1.417	58.11	2.417	4.46	3.42	1.51
0.500	2.65	1.500	58.11	2.500	4.46	3.50	1.51
0.583	4.00	1.583	28.06	2.583	3.56	3.58	1.32
0.667	4.00	1.667	28.06	2.667	3.56	3.67	1.32
0.750	6.73	1.750	16.53	2.750	2.90	3.75	1.16
0.833	6.73	1.833	16.53	2.833	2.90	3.83	1.16
0.917	13.69	1.917	10.90	2.917	2.41	3.92	1.03
1.000	13.69	2.000	10.90	3.000	2.41	4.00	1.03

Max.Eff.Inten.(mm/hr)=		138.79	43.97	
over (min)		5.00	15.00	
Storage Coeff. (min)=		2.79 (ii)	12.60 (ii)	
Unit Hyd. Tpeak (min)=		5.00	15.00	
Unit Hyd. peak (cms)=		0.28	0.08	
				TOTALS
PEAK FLOW	(cms)=	0.28	0.18	0.362 (iii)
TIME TO PEAK	(hrs)=	1.33	1.50	1.33
RUNOFF VOLUME	(mm)=	59.23	21.23	30.16
TOTAL RAINFALL	(mm)=	60.23	60.23	60.23
RUNOFF COEFFICIENT	=	0.98	0.35	0.50

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 71.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB			
STANDHYD (0023)	Area (ha)=	0.50	
ID= 1 DT= 5.0 min	Total Imp(%)=	28.20	Dir. Conn.(%)= 28.20

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.14	0.36
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	57.60	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	1.41	1.083	43.05	2.083	7.72	3.08	2.04
0.167	1.41	1.167	43.05	2.167	7.72	3.17	2.04
0.250	1.89	1.250	138.79	2.250	5.76	3.25	1.74
0.333	1.89	1.333	138.79	2.333	5.76	3.33	1.74
0.417	2.65	1.417	58.11	2.417	4.46	3.42	1.51
0.500	2.65	1.500	58.11	2.500	4.46	3.50	1.51
0.583	4.00	1.583	28.06	2.583	3.56	3.58	1.32
0.667	4.00	1.667	28.06	2.667	3.56	3.67	1.32
0.750	6.73	1.750	16.53	2.750	2.90	3.75	1.16
0.833	6.73	1.833	16.53	2.833	2.90	3.83	1.16
0.917	13.69	1.917	10.90	2.917	2.41	3.92	1.03
1.000	13.69	2.000	10.90	3.000	2.41	4.00	1.03

Max.Eff.Inten.(mm/hr)=		138.79	43.97	
over (min)		5.00	15.00	
Storage Coeff. (min)=		1.61 (ii)	11.41 (ii)	
Unit Hyd. Tpeak (min)=		5.00	15.00	
Unit Hyd. peak (cms)=		0.32	0.09	

				TOTALS
PEAK FLOW	(cms)=	0.05	0.03	0.067 (iii)
TIME TO PEAK	(hrs)=	1.33	1.50	1.33
RUNOFF VOLUME	(mm)=	59.23	21.23	31.93
TOTAL RAINFALL	(mm)=	60.23	60.23	60.23
RUNOFF COEFFICIENT	=	0.98	0.35	0.53

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 71.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB			
STANDHYD (0024)	Area (ha)=	0.53	
ID= 1 DT= 5.0 min	Total Imp(%)=	34.09	Dir. Conn.(%)= 34.09

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.18	0.35
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	59.35	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	1.41	1.083	43.05	2.083	7.72	3.08	2.04
0.167	1.41	1.167	43.05	2.167	7.72	3.17	2.04
0.250	1.89	1.250	138.79	2.250	5.76	3.25	1.74
0.333	1.89	1.333	138.79	2.333	5.76	3.33	1.74
0.417	2.65	1.417	58.11	2.417	4.46	3.42	1.51
0.500	2.65	1.500	58.11	2.500	4.46	3.50	1.51
0.583	4.00	1.583	28.06	2.583	3.56	3.58	1.32
0.667	4.00	1.667	28.06	2.667	3.56	3.67	1.32
0.750	6.73	1.750	16.53	2.750	2.90	3.75	1.16
0.833	6.73	1.833	16.53	2.833	2.90	3.83	1.16
0.917	13.69	1.917	10.90	2.917	2.41	3.92	1.03
1.000	13.69	2.000	10.90	3.000	2.41	4.00	1.03

Max.Eff.Inten.	(mm/hr)=	138.79	43.97	
	over (min)	5.00	15.00	
Storage Coeff.	(min)=	1.64 (ii)	11.44 (ii)	
Unit Hyd. Tpeak	(min)=	5.00	15.00	
Unit Hyd. peak	(cms)=	0.32	0.09	
				TOTALS
PEAK FLOW	(cms)=	0.07	0.03	0.082 (iii)
TIME TO PEAK	(hrs)=	1.33	1.50	1.33
RUNOFF VOLUME	(mm)=	59.23	21.23	34.17
TOTAL RAINFALL	(mm)=	60.23	60.23	60.23
RUNOFF COEFFICIENT	=	0.98	0.35	0.57

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 71.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB			
STANDHYD (0025)	Area (ha)=	0.26	
ID= 1 DT= 5.0 min	Total Imp(%)=	37.90	Dir. Conn.(%)= 37.90

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.10	0.16
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	41.50	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	1.41	1.083	43.05	2.083	7.72	3.08	2.04
0.167	1.41	1.167	43.05	2.167	7.72	3.17	2.04
0.250	1.89	1.250	138.79	2.250	5.76	3.25	1.74
0.333	1.89	1.333	138.79	2.333	5.76	3.33	1.74
0.417	2.65	1.417	58.11	2.417	4.46	3.42	1.51
0.500	2.65	1.500	58.11	2.500	4.46	3.50	1.51
0.583	4.00	1.583	28.06	2.583	3.56	3.58	1.32
0.667	4.00	1.667	28.06	2.667	3.56	3.67	1.32
0.750	6.73	1.750	16.53	2.750	2.90	3.75	1.16
0.833	6.73	1.833	16.53	2.833	2.90	3.83	1.16
0.917	13.69	1.917	10.90	2.917	2.41	3.92	1.03
1.000	13.69	2.000	10.90	3.000	2.41	4.00	1.03

Max.Eff.Inten.	(mm/hr)=	138.79	43.97	
	over (min)	5.00	15.00	
Storage Coeff.	(min)=	1.32 (ii)	11.13 (ii)	
Unit Hyd. Tpeak	(min)=	5.00	15.00	
Unit Hyd. peak	(cms)=	0.33	0.09	
				TOTALS
PEAK FLOW	(cms)=	0.04	0.01	0.044 (iii)
TIME TO PEAK	(hrs)=	1.33	1.50	1.33
RUNOFF VOLUME	(mm)=	59.23	21.23	35.61
TOTAL RAINFALL	(mm)=	60.23	60.23	60.23
RUNOFF COEFFICIENT	=	0.98	0.35	0.59

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 71.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB			
STANDHYD (0026)	Area (ha)=	0.73	
ID= 1 DT= 5.0 min	Total Imp(%)=	36.77	Dir. Conn.(%)= 36.77

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.27	0.46
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	69.58	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	1.41	1.083	43.05	2.083	7.72	3.08	2.04
0.167	1.41	1.167	43.05	2.167	7.72	3.17	2.04
0.250	1.89	1.250	138.79	2.250	5.76	3.25	1.74
0.333	1.89	1.333	138.79	2.333	5.76	3.33	1.74
0.417	2.65	1.417	58.11	2.417	4.46	3.42	1.51
0.500	2.65	1.500	58.11	2.500	4.46	3.50	1.51
0.583	4.00	1.583	28.06	2.583	3.56	3.58	1.32
0.667	4.00	1.667	28.06	2.667	3.56	3.67	1.32
0.750	6.73	1.750	16.53	2.750	2.90	3.75	1.16
0.833	6.73	1.833	16.53	2.833	2.90	3.83	1.16
0.917	13.69	1.917	10.90	2.917	2.41	3.92	1.03
1.000	13.69	2.000	10.90	3.000	2.41	4.00	1.03

Max.Eff.Inten.	(mm/hr)=	138.79	43.97	
	over (min)	5.00	15.00	
Storage Coeff.	(min)=	1.80 (ii)	11.61 (ii)	
Unit Hyd. Tpeak	(min)=	5.00	15.00	
Unit Hyd. peak	(cms)=	0.32	0.09	
				TOTALS
PEAK FLOW	(cms)=	0.10	0.04	0.119 (iii)
TIME TO PEAK	(hrs)=	1.33	1.50	1.33
RUNOFF VOLUME	(mm)=	59.23	21.23	35.20
TOTAL RAINFALL	(mm)=	60.23	60.23	60.23
RUNOFF COEFFICIENT	=	0.98	0.35	0.58

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 71.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL

THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

****
** SIMULATION:5) 50-Year **
****

CALIB	
STANDHYD (0019)	Area (ha)= 2.21
ID= 1 DT= 5.0 min	Total Imp(%)= 6.87 Dir. Conn.(%)= 6.87

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.15	2.06
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	121.48	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	2.18	1.083	52.37	2.083	11.13	3.08	3.12
0.167	2.18	1.167	52.37	2.167	11.13	3.17	3.12
0.250	2.89	1.250	139.71	2.250	8.44	3.25	2.68
0.333	2.89	1.333	139.71	2.333	8.44	3.33	2.68
0.417	4.02	1.417	68.44	2.417	6.62	3.42	2.33
0.500	4.02	1.500	68.44	2.500	6.62	3.50	2.33
0.583	5.96	1.583	36.37	2.583	5.33	3.58	2.04
0.667	5.96	1.667	36.37	2.667	5.33	3.67	2.04
0.750	9.77	1.750	22.56	2.750	4.38	3.75	1.81
0.833	9.77	1.833	22.56	2.833	4.38	3.83	1.81
0.917	18.93	1.917	15.36	2.917	3.67	3.92	1.61
1.000	18.93	2.000	15.36	3.000	3.67	4.00	1.61

				TOTALS
Max.Eff.Inten.(mm/hr)=		139.71	49.88	
over (min)		5.00	15.00	
Storage Coeff. (min)=		2.51 (ii)	11.83 (ii)	
Unit Hyd. Tpeak (min)=		5.00	15.00	
Unit Hyd. peak (cms)=		0.29	0.09	
PEAK FLOW	(cms)=	0.06	0.19	0.215 (iii)
TIME TO PEAK	(hrs)=	1.33	1.50	1.50
RUNOFF VOLUME	(mm)=	70.95	28.49	31.41
TOTAL RAINFALL	(mm)=	71.95	71.95	71.95
RUNOFF COEFFICIENT	=	0.99	0.40	0.44

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
YOU SHOULD CONSIDER SPLITTING THE AREA.

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 71.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB	
STANDHYD (0020)	Area (ha)= 0.09
ID= 1 DT= 5.0 min	Total Imp(%)= 36.36 Dir. Conn.(%)= 36.36

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.03	0.05
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	23.84	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	2.18	1.083	52.37	2.083	11.13	3.08	3.12
0.167	2.18	1.167	52.37	2.167	11.13	3.17	3.12
0.250	2.89	1.250	139.71	2.250	8.44	3.25	2.68
0.333	2.89	1.333	139.71	2.333	8.44	3.33	2.68
0.417	4.02	1.417	68.44	2.417	6.62	3.42	2.33
0.500	4.02	1.500	68.44	2.500	6.62	3.50	2.33
0.583	5.96	1.583	36.37	2.583	5.33	3.58	2.04
0.667	5.96	1.667	36.37	2.667	5.33	3.67	2.04
0.750	9.77	1.750	22.56	2.750	4.38	3.75	1.81
0.833	9.77	1.833	22.56	2.833	4.38	3.83	1.81
0.917	18.93	1.917	15.36	2.917	3.67	3.92	1.61
1.000	18.93	2.000	15.36	3.000	3.67	4.00	1.61

				TOTALS
Max.Eff.Inten.(mm/hr)=		139.71	49.88	
over (min)		5.00	15.00	
Storage Coeff. (min)=		0.95 (ii)	10.27 (ii)	
Unit Hyd. Tpeak (min)=		5.00	15.00	
Unit Hyd. peak (cms)=		0.34	0.09	
PEAK FLOW	(cms)=	0.01	0.01	0.015 (iii)
TIME TO PEAK	(hrs)=	1.33	1.50	1.33
RUNOFF VOLUME	(mm)=	70.95	28.49	43.86
TOTAL RAINFALL	(mm)=	71.95	71.95	71.95
RUNOFF COEFFICIENT	=	0.99	0.40	0.61

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 71.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB	
STANDHYD (0021)	Area (ha)= 2.59
ID= 1 DT= 5.0 min	Total Imp(%)= 21.41 Dir. Conn.(%)= 21.41

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.56	2.04
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	131.48	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	2.18	1.083	52.37	2.083	11.13	3.08	3.12
0.167	2.18	1.167	52.37	2.167	11.13	3.17	3.12
0.250	2.89	1.250	139.71	2.250	8.44	3.25	2.68
0.333	2.89	1.333	139.71	2.333	8.44	3.33	2.68
0.417	4.02	1.417	68.44	2.417	6.62	3.42	2.33
0.500	4.02	1.500	68.44	2.500	6.62	3.50	2.33
0.583	5.96	1.583	36.37	2.583	5.33	3.58	2.04
0.667	5.96	1.667	36.37	2.667	5.33	3.67	2.04
0.750	9.77	1.750	22.56	2.750	4.38	3.75	1.81
0.833	9.77	1.833	22.56	2.833	4.38	3.83	1.81
0.917	18.93	1.917	15.36	2.917	3.67	3.92	1.61
1.000	18.93	2.000	15.36	3.000	3.67	4.00	1.61

				TOTALS
Max.Eff.Inten.(mm/hr)=		139.71	49.88	
over (min)		5.00	15.00	
Storage Coeff. (min)=		2.63 (ii)	11.96 (ii)	
Unit Hyd. Tpeak (min)=		5.00	15.00	
Unit Hyd. peak (cms)=		0.29	0.09	
PEAK FLOW	(cms)=	0.21	0.18	0.304 (iii)
TIME TO PEAK	(hrs)=	1.33	1.50	1.33
RUNOFF VOLUME	(mm)=	70.95	28.49	37.58
TOTAL RAINFALL	(mm)=	71.95	71.95	71.95
RUNOFF COEFFICIENT	=	0.99	0.40	0.52

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 71.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB	
STANDHYD (0022)	Area (ha)= 3.13

|ID= 1 DT= 5.0 min | Total Imp(%)= 23.51 Dir. Conn.(%)= 23.51

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.74	2.39
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	144.41	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	2.18	1.083	52.37	2.083	11.13	3.08	3.12
0.167	2.18	1.167	52.37	2.167	11.13	3.17	3.12
0.250	2.89	1.250	139.71	2.250	8.44	3.25	2.68
0.333	2.89	1.333	139.71	2.333	8.44	3.33	2.68
0.417	4.02	1.417	68.44	2.417	6.62	3.42	2.33
0.500	4.02	1.500	68.44	2.500	6.62	3.50	2.33
0.583	5.96	1.583	36.37	2.583	5.33	3.58	2.04
0.667	5.96	1.667	36.37	2.667	5.33	3.67	2.04
0.750	9.77	1.750	22.56	2.750	4.38	3.75	1.81
0.833	9.77	1.833	22.56	2.833	4.38	3.83	1.81
0.917	18.93	1.917	15.36	2.917	3.67	3.92	1.61
1.000	18.93	2.000	15.36	3.000	3.67	4.00	1.61

				TOTALS
Max.Eff.Inten.(mm/hr)=		139.71	49.88	
over (min)		5.00	15.00	
Storage Coeff. (min)=		2.79 (ii)	12.11 (ii)	
Unit Hyd. Tpeak (min)=		5.00	15.00	
Unit Hyd. peak (cms)=		0.28	0.09	
PEAK FLOW	(cms)=	0.28	0.21	0.387 (iii)
TIME TO PEAK	(hrs)=	1.33	1.50	1.33
RUNOFF VOLUME	(mm)=	70.95	28.49	38.47
TOTAL RAINFALL	(mm)=	71.95	71.95	71.95
RUNOFF COEFFICIENT	=	0.99	0.40	0.53

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 71.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB
STANDHYD (0023)

Area (ha)= 0.50
|ID= 1 DT= 5.0 min | Total Imp(%)= 28.20 Dir. Conn.(%)= 28.20

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.14	0.36
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	57.60	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	2.18	1.083	52.37	2.083	11.13	3.08	3.12
0.167	2.18	1.167	52.37	2.167	11.13	3.17	3.12
0.250	2.89	1.250	139.71	2.250	8.44	3.25	2.68
0.333	2.89	1.333	139.71	2.333	8.44	3.33	2.68
0.417	4.02	1.417	68.44	2.417	6.62	3.42	2.33
0.500	4.02	1.500	68.44	2.500	6.62	3.50	2.33
0.583	5.96	1.583	36.37	2.583	5.33	3.58	2.04
0.667	5.96	1.667	36.37	2.667	5.33	3.67	2.04
0.750	9.77	1.750	22.56	2.750	4.38	3.75	1.81
0.833	9.77	1.833	22.56	2.833	4.38	3.83	1.81
0.917	18.93	1.917	15.36	2.917	3.67	3.92	1.61
1.000	18.93	2.000	15.36	3.000	3.67	4.00	1.61

Max.Eff.Inten.(mm/hr)=		139.71	49.88
over (min)		5.00	15.00
Storage Coeff. (min)=		1.61 (ii)	10.93 (ii)
Unit Hyd. Tpeak (min)=		5.00	15.00
Unit Hyd. peak (cms)=		0.32	0.09

			TOTALS
PEAK FLOW	(cms)=	0.05	0.03	0.071 (iii)
TIME TO PEAK	(hrs)=	1.33	1.50	1.33
RUNOFF VOLUME	(mm)=	70.95	28.49	40.45
TOTAL RAINFALL	(mm)=	71.95	71.95	71.95
RUNOFF COEFFICIENT	=	0.99	0.40	0.56

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 71.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB
STANDHYD (0024)

Area (ha)= 0.53
|ID= 1 DT= 5.0 min | Total Imp(%)= 34.09 Dir. Conn.(%)= 34.09

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.18	0.35
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	59.35	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	2.18	1.083	52.37	2.083	11.13	3.08	3.12
0.167	2.18	1.167	52.37	2.167	11.13	3.17	3.12
0.250	2.89	1.250	139.71	2.250	8.44	3.25	2.68
0.333	2.89	1.333	139.71	2.333	8.44	3.33	2.68
0.417	4.02	1.417	68.44	2.417	6.62	3.42	2.33
0.500	4.02	1.500	68.44	2.500	6.62	3.50	2.33
0.583	5.96	1.583	36.37	2.583	5.33	3.58	2.04
0.667	5.96	1.667	36.37	2.667	5.33	3.67	2.04
0.750	9.77	1.750	22.56	2.750	4.38	3.75	1.81
0.833	9.77	1.833	22.56	2.833	4.38	3.83	1.81
0.917	18.93	1.917	15.36	2.917	3.67	3.92	1.61
1.000	18.93	2.000	15.36	3.000	3.67	4.00	1.61

				TOTALS
Max.Eff.Inten.(mm/hr)=		139.71	49.88	
over (min)		5.00	15.00	
Storage Coeff. (min)=		1.63 (ii)	10.96 (ii)	
Unit Hyd. Tpeak (min)=		5.00	15.00	
Unit Hyd. peak (cms)=		0.32	0.09	
PEAK FLOW	(cms)=	0.07	0.03	0.086 (iii)
TIME TO PEAK	(hrs)=	1.33	1.50	1.33
RUNOFF VOLUME	(mm)=	70.95	28.49	42.95
TOTAL RAINFALL	(mm)=	71.95	71.95	71.95
RUNOFF COEFFICIENT	=	0.99	0.40	0.60

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 71.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB
STANDHYD (0025)

Area (ha)= 0.26
|ID= 1 DT= 5.0 min | Total Imp(%)= 37.90 Dir. Conn.(%)= 37.90

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.10	0.16
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	41.50	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	2.18	1.083	52.37	2.083	11.13	3.08	3.12
0.167	2.18	1.167	52.37	2.167	11.13	3.17	3.12
0.250	2.89	1.250	139.71	2.250	8.44	3.25	2.68
0.333	2.89	1.333	139.71	2.333	8.44	3.33	2.68
0.417	4.02	1.417	68.44	2.417	6.62	3.42	2.33
0.500	4.02	1.500	68.44	2.500	6.62	3.50	2.33
0.583	5.96	1.583	36.37	2.583	5.33	3.58	2.04
0.667	5.96	1.667	36.37	2.667	5.33	3.67	2.04
0.750	9.77	1.750	22.56	2.750	4.38	3.75	1.81
0.833	9.77	1.833	22.56	2.833	4.38	3.83	1.81
0.917	18.93	1.917	15.36	2.917	3.67	3.92	1.61
1.000	18.93	2.000	15.36	3.000	3.67	4.00	1.61

Max.Eff.Inten.(mm/hr)=		139.71	49.88	
over (min)		5.00	15.00	
Storage Coeff. (min)=		1.32 (ii)	10.64 (ii)	
Unit Hyd. Tpeak (min)=		5.00	15.00	
Unit Hyd. peak (cms)=		0.33	0.09	
				TOTALS
PEAK FLOW	(cms)=	0.04	0.02	0.046 (iii)
TIME TO PEAK	(hrs)=	1.33	1.50	1.33
RUNOFF VOLUME	(mm)=	70.95	28.49	44.55
TOTAL RAINFALL	(mm)=	71.95	71.95	71.95
RUNOFF COEFFICIENT	=	0.99	0.40	0.62

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 71.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB				
STANDHYD (0026)	Area (ha)= 0.73			
ID= 1 DT= 5.0 min	Total Imp(%)= 36.77	Dir. Conn.(%)= 36.77		

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.27	0.46
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	69.58	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	2.18	1.083	52.37	2.083	11.13	3.08	3.12
0.167	2.18	1.167	52.37	2.167	11.13	3.17	3.12
0.250	2.89	1.250	139.71	2.250	8.44	3.25	2.68
0.333	2.89	1.333	139.71	2.333	8.44	3.33	2.68
0.417	4.02	1.417	68.44	2.417	6.62	3.42	2.33
0.500	4.02	1.500	68.44	2.500	6.62	3.50	2.33
0.583	5.96	1.583	36.37	2.583	5.33	3.58	2.04
0.667	5.96	1.667	36.37	2.667	5.33	3.67	2.04
0.750	9.77	1.750	22.56	2.750	4.38	3.75	1.81
0.833	9.77	1.833	22.56	2.833	4.38	3.83	1.81
0.917	18.93	1.917	15.36	2.917	3.67	3.92	1.61
1.000	18.93	2.000	15.36	3.000	3.67	4.00	1.61

Max.Eff.Inten.(mm/hr)=		139.71	49.88	
over (min)		5.00	15.00	
Storage Coeff. (min)=		1.80 (ii)	11.12 (ii)	
Unit Hyd. Tpeak (min)=		5.00	15.00	
Unit Hyd. peak (cms)=		0.32	0.09	
				TOTALS
PEAK FLOW	(cms)=	0.10	0.04	0.125 (iii)
TIME TO PEAK	(hrs)=	1.33	1.50	1.33
RUNOFF VOLUME	(mm)=	70.95	28.49	44.10
TOTAL RAINFALL	(mm)=	71.95	71.95	71.95
RUNOFF COEFFICIENT	=	0.99	0.40	0.61

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 71.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

****
** SIMULATION:6) 100-Year **
****

CALIB				
STANDHYD (0019)	Area (ha)= 2.21			
ID= 1 DT= 5.0 min	Total Imp(%)= 6.87	Dir. Conn.(%)= 6.87		

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.15	2.06
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	121.48	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	2.89	1.083	60.52	2.083	14.14	3.08	4.10
0.167	2.89	1.167	60.52	2.167	14.14	3.17	4.10
0.250	3.81	1.250	147.05	2.250	10.82	3.25	3.54
0.333	3.81	1.333	147.05	2.333	10.82	3.33	3.54
0.417	5.26	1.417	77.70	2.417	8.55	3.42	3.08
0.500	5.26	1.500	77.70	2.500	8.55	3.50	3.08
0.583	7.73	1.583	43.43	2.583	6.93	3.58	2.71
0.667	7.73	1.667	43.43	2.667	6.93	3.67	2.71
0.750	12.46	1.750	27.74	2.750	5.73	3.75	2.40
0.833	12.46	1.833	27.74	2.833	5.73	3.83	2.40
0.917	23.45	1.917	19.25	2.917	4.81	3.92	2.14
1.000	23.45	2.000	19.25	3.000	4.81	4.00	2.14

Max.Eff.Inten.(mm/hr)=		147.05	57.97	
over (min)		5.00	15.00	
Storage Coeff. (min)=		2.46 (ii)	11.24 (ii)	
Unit Hyd. Tpeak (min)=		5.00	15.00	
Unit Hyd. peak (cms)=		0.30	0.09	
				TOTALS
PEAK FLOW	(cms)=	0.06	0.23	0.258 (iii)
TIME TO PEAK	(hrs)=	1.33	1.50	1.50
RUNOFF VOLUME	(mm)=	82.38	36.11	39.29
TOTAL RAINFALL	(mm)=	83.38	83.38	83.38
RUNOFF COEFFICIENT	=	0.99	0.43	0.47

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
YOU SHOULD CONSIDER SPLITTING THE AREA.

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 71.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB				
STANDHYD (0020)	Area (ha)= 0.09			
ID= 1 DT= 5.0 min	Total Imp(%)= 36.36	Dir. Conn.(%)= 36.36		

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.03	0.05
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	23.84	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	2.89	1.083	60.52	2.083	14.14	3.08	4.10
0.167	2.89	1.167	60.52	2.167	14.14	3.17	4.10
0.250	3.81	1.250	147.05	2.250	10.82	3.25	3.54
0.333	3.81	1.333	147.05	2.333	10.82	3.33	3.54

0.417	5.26	1.417	77.70	2.417	8.55	3.42	3.08
0.500	5.26	1.500	77.70	2.500	8.55	3.50	3.08
0.583	7.73	1.583	43.43	2.583	6.93	3.58	2.71
0.667	7.73	1.667	43.43	2.667	6.93	3.67	2.71
0.750	12.46	1.750	27.74	2.750	5.73	3.75	2.40
0.833	12.46	1.833	27.74	2.833	5.73	3.83	2.40
0.917	23.45	1.917	19.25	2.917	4.81	3.92	2.14
1.000	23.45	2.000	19.25	3.000	4.81	4.00	2.14

Max.Eff.Inten.(mm/hr)=		147.05	57.97	
over (min)		5.00	10.00	
Storage Coeff. (min)=		0.93 (ii)	9.70 (ii)	
Unit Hyd. Tpeak (min)=		5.00	10.00	
Unit Hyd. peak (cms)=		0.34	0.11	
				TOTALS
PEAK FLOW	(cms)=	0.01	0.01	0.018 (iii)
TIME TO PEAK	(hrs)=	1.33	1.42	1.33
RUNOFF VOLUME	(mm)=	82.38	36.11	52.87
TOTAL RAINFALL	(mm)=	83.38	83.38	83.38
RUNOFF COEFFICIENT	=	0.99	0.43	0.63

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 71.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB			
STANDHYD (0021)	Area (ha)=	2.59	
ID= 1 DT= 5.0 min	Total Imp(%)=	21.41	Dir. Conn.(%)= 21.41

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.56	2.04
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	131.48	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	2.89	1.083	60.52	2.083	14.14	3.08	4.10
0.167	2.89	1.167	60.52	2.167	14.14	3.17	4.10
0.250	3.81	1.250	147.05	2.250	10.82	3.25	3.54
0.333	3.81	1.333	147.05	2.333	10.82	3.33	3.54
0.417	5.26	1.417	77.70	2.417	8.55	3.42	3.08
0.500	5.26	1.500	77.70	2.500	8.55	3.50	3.08
0.583	7.73	1.583	43.43	2.583	6.93	3.58	2.71
0.667	7.73	1.667	43.43	2.667	6.93	3.67	2.71
0.750	12.46	1.750	27.74	2.750	5.73	3.75	2.40
0.833	12.46	1.833	27.74	2.833	5.73	3.83	2.40
0.917	23.45	1.917	19.25	2.917	4.81	3.92	2.14
1.000	23.45	2.000	19.25	3.000	4.81	4.00	2.14

Max.Eff.Inten.(mm/hr)=		147.05	57.97	
over (min)		5.00	15.00	
Storage Coeff. (min)=		2.58 (ii)	11.36 (ii)	
Unit Hyd. Tpeak (min)=		5.00	15.00	
Unit Hyd. peak (cms)=		0.29	0.09	
				TOTALS
PEAK FLOW	(cms)=	0.22	0.22	0.343 (iii)
TIME TO PEAK	(hrs)=	1.33	1.50	1.50
RUNOFF VOLUME	(mm)=	82.38	36.11	46.02
TOTAL RAINFALL	(mm)=	83.38	83.38	83.38
RUNOFF COEFFICIENT	=	0.99	0.43	0.55

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 71.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB			
STANDHYD (0022)	Area (ha)=	3.13	
ID= 1 DT= 5.0 min	Total Imp(%)=	23.51	Dir. Conn.(%)= 23.51

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.74	2.39
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	144.41	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	2.89	1.083	60.52	2.083	14.14	3.08	4.10
0.167	2.89	1.167	60.52	2.167	14.14	3.17	4.10
0.250	3.81	1.250	147.05	2.250	10.82	3.25	3.54
0.333	3.81	1.333	147.05	2.333	10.82	3.33	3.54
0.417	5.26	1.417	77.70	2.417	8.55	3.42	3.08
0.500	5.26	1.500	77.70	2.500	8.55	3.50	3.08
0.583	7.73	1.583	43.43	2.583	6.93	3.58	2.71
0.667	7.73	1.667	43.43	2.667	6.93	3.67	2.71
0.750	12.46	1.750	27.74	2.750	5.73	3.75	2.40
0.833	12.46	1.833	27.74	2.833	5.73	3.83	2.40
0.917	23.45	1.917	19.25	2.917	4.81	3.92	2.14
1.000	23.45	2.000	19.25	3.000	4.81	4.00	2.14

Max.Eff.Inten.(mm/hr)=		147.05	57.97	
over (min)		5.00	15.00	
Storage Coeff. (min)=		2.73 (ii)	11.51 (ii)	
Unit Hyd. Tpeak (min)=		5.00	15.00	
Unit Hyd. peak (cms)=		0.29	0.09	
				TOTALS
PEAK FLOW	(cms)=	0.30	0.26	0.432 (iii)
TIME TO PEAK	(hrs)=	1.33	1.50	1.33
RUNOFF VOLUME	(mm)=	82.38	36.11	46.99
TOTAL RAINFALL	(mm)=	83.38	83.38	83.38
RUNOFF COEFFICIENT	=	0.99	0.43	0.56

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 71.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB			
STANDHYD (0023)	Area (ha)=	0.50	
ID= 1 DT= 5.0 min	Total Imp(%)=	28.20	Dir. Conn.(%)= 28.20

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.14	0.36
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	57.60	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	2.89	1.083	60.52	2.083	14.14	3.08	4.10
0.167	2.89	1.167	60.52	2.167	14.14	3.17	4.10
0.250	3.81	1.250	147.05	2.250	10.82	3.25	3.54
0.333	3.81	1.333	147.05	2.333	10.82	3.33	3.54
0.417	5.26	1.417	77.70	2.417	8.55	3.42	3.08
0.500	5.26	1.500	77.70	2.500	8.55	3.50	3.08
0.583	7.73	1.583	43.43	2.583	6.93	3.58	2.71
0.667	7.73	1.667	43.43	2.667	6.93	3.67	2.71
0.750	12.46	1.750	27.74	2.750	5.73	3.75	2.40
0.833	12.46	1.833	27.74	2.833	5.73	3.83	2.40
0.917	23.45	1.917	19.25	2.917	4.81	3.92	2.14
1.000	23.45	2.000	19.25	3.000	4.81	4.00	2.14

Max.Eff.Inten.(mm/hr)=		147.05	57.97
over (min)		5.00	15.00
Storage Coeff. (min)=		1.57 (ii)	10.35 (ii)

```
     Unit Hyd. Tpeak (min)=       5.00         15.00
     Unit Hyd. peak  (cms)=       0.33          0.09
                                                      *TOTALS*
     PEAK FLOW       (cms)=       0.06          0.04          0.079 (iii)
     TIME TO PEAK    (hrs)=       1.33          1.50           1.33
     RUNOFF VOLUME    (mm)=      82.38         36.11          49.15
     TOTAL RAINFALL   (mm)=      83.38         83.38          83.38
     RUNOFF COEFFICIENT   =       0.99          0.43           0.59

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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| CALIB            |
| STANDHYD (  0024)|   Area    (ha)=   0.53
|ID= 1 DT= 5.0 min |   Total Imp(%)=  34.09   Dir. Conn.(%)=  34.09
--------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.18          0.35
     Dep. Storage     (mm)=       1.00          1.50
     Average Slope     (%)=       1.00          2.00
     Length            (m)=      59.35         40.00
     Mannings n            =      0.013         0.250

        NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                          ---- TRANSFORMED HYETOGRAPH ----
               TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
              0.083    2.89 | 1.083   60.52 | 2.083   14.14 |  3.08    4.10
              0.167    2.89 | 1.167   60.52 | 2.167   14.14 |  3.17    4.10
              0.250    3.81 | 1.250  147.05 | 2.250   10.82 |  3.25    3.54
              0.333    3.81 | 1.333  147.05 | 2.333   10.82 |  3.33    3.54
              0.417    5.26 | 1.417   77.70 | 2.417    8.55 |  3.42    3.08
              0.500    5.26 | 1.500   77.70 | 2.500    8.55 |  3.50    3.08
              0.583    7.73 | 1.583   43.43 | 2.583    6.93 |  3.58    2.71
              0.667    7.73 | 1.667   43.43 | 2.667    6.93 |  3.67    2.71
              0.750   12.46 | 1.750   27.74 | 2.750    5.73 |  3.75    2.40
              0.833   12.46 | 1.833   27.74 | 2.833    5.73 |  3.83    2.40
              0.917   23.45 | 1.917   19.25 | 2.917    4.81 |  3.92    2.14
              1.000   23.45 | 2.000   19.25 | 3.000    4.81 |  4.00    2.14

     Max.Eff.Inten.(mm/hr)=     147.05         57.97
               over (min)         5.00         15.00
     Storage Coeff.  (min)=       1.60 (ii)   10.38 (ii)
     Unit Hyd. Tpeak (min)=       5.00         15.00
     Unit Hyd. peak  (cms)=       0.32          0.09
                                                      *TOTALS*
     PEAK FLOW       (cms)=       0.07          0.04          0.094 (iii)
     TIME TO PEAK    (hrs)=       1.33          1.50           1.33
     RUNOFF VOLUME    (mm)=      82.38         36.11          51.87
     TOTAL RAINFALL   (mm)=      83.38         83.38          83.38
     RUNOFF COEFFICIENT   =       0.99          0.43           0.62

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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| CALIB            |
| STANDHYD (  0025)|   Area    (ha)=   0.26
|ID= 1 DT= 5.0 min |   Total Imp(%)=  37.90   Dir. Conn.(%)=  37.90
--------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.10          0.16
     Dep. Storage     (mm)=       1.00          1.50
     Average Slope     (%)=       1.00          2.00
     Length            (m)=      41.50         40.00
     Mannings n            =      0.013         0.250

        NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.
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                          ---- TRANSFORMED HYETOGRAPH ----
               TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
              0.083    2.89 | 1.083   60.52 | 2.083   14.14 |  3.08    4.10
              0.167    2.89 | 1.167   60.52 | 2.167   14.14 |  3.17    4.10
              0.250    3.81 | 1.250  147.05 | 2.250   10.82 |  3.25    3.54
              0.333    3.81 | 1.333  147.05 | 2.333   10.82 |  3.33    3.54
              0.417    5.26 | 1.417   77.70 | 2.417    8.55 |  3.42    3.08
              0.500    5.26 | 1.500   77.70 | 2.500    8.55 |  3.50    3.08
              0.583    7.73 | 1.583   43.43 | 2.583    6.93 |  3.58    2.71
              0.667    7.73 | 1.667   43.43 | 2.667    6.93 |  3.67    2.71
              0.750   12.46 | 1.750   27.74 | 2.750    5.73 |  3.75    2.40
              0.833   12.46 | 1.833   27.74 | 2.833    5.73 |  3.83    2.40
              0.917   23.45 | 1.917   19.25 | 2.917    4.81 |  3.92    2.14
              1.000   23.45 | 2.000   19.25 | 3.000    4.81 |  4.00    2.14

     Max.Eff.Inten.(mm/hr)=     147.05         57.97
               over (min)         5.00         15.00
     Storage Coeff.  (min)=       1.29 (ii)   10.07 (ii)
     Unit Hyd. Tpeak (min)=       5.00         15.00
     Unit Hyd. peak  (cms)=       0.33          0.10
                                                      *TOTALS*
     PEAK FLOW       (cms)=       0.04          0.02          0.050 (iii)
     TIME TO PEAK    (hrs)=       1.33          1.50           1.33
     RUNOFF VOLUME    (mm)=      82.38         36.11          53.63
     TOTAL RAINFALL   (mm)=      83.38         83.38          83.38
     RUNOFF COEFFICIENT   =       0.99          0.43           0.64

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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| CALIB            |
| STANDHYD (  0026)|   Area    (ha)=   0.73
|ID= 1 DT= 5.0 min |   Total Imp(%)=  36.77   Dir. Conn.(%)=  36.77
--------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.27          0.46
     Dep. Storage     (mm)=       1.00          1.50
     Average Slope     (%)=       1.00          2.00
     Length            (m)=      69.58         40.00
     Mannings n            =      0.013         0.250

        NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                          ---- TRANSFORMED HYETOGRAPH ----
               TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
              0.083    2.89 | 1.083   60.52 | 2.083   14.14 |  3.08    4.10
              0.167    2.89 | 1.167   60.52 | 2.167   14.14 |  3.17    4.10
              0.250    3.81 | 1.250  147.05 | 2.250   10.82 |  3.25    3.54
              0.333    3.81 | 1.333  147.05 | 2.333   10.82 |  3.33    3.54
              0.417    5.26 | 1.417   77.70 | 2.417    8.55 |  3.42    3.08
              0.500    5.26 | 1.500   77.70 | 2.500    8.55 |  3.50    3.08
              0.583    7.73 | 1.583   43.43 | 2.583    6.93 |  3.58    2.71
              0.667    7.73 | 1.667   43.43 | 2.667    6.93 |  3.67    2.71
              0.750   12.46 | 1.750   27.74 | 2.750    5.73 |  3.75    2.40
              0.833   12.46 | 1.833   27.74 | 2.833    5.73 |  3.83    2.40
              0.917   23.45 | 1.917   19.25 | 2.917    4.81 |  3.92    2.14
              1.000   23.45 | 2.000   19.25 | 3.000    4.81 |  4.00    2.14

     Max.Eff.Inten.(mm/hr)=     147.05         57.97
               over (min)         5.00         15.00
     Storage Coeff.  (min)=       1.76 (ii)   10.54 (ii)
     Unit Hyd. Tpeak (min)=       5.00         15.00
     Unit Hyd. peak  (cms)=       0.32          0.09
                                                      *TOTALS*
     PEAK FLOW       (cms)=       0.11          0.05          0.136 (iii)
     TIME TO PEAK    (hrs)=       1.33          1.50           1.33
     RUNOFF VOLUME    (mm)=      82.38         36.11          53.12
     TOTAL RAINFALL   (mm)=      83.38         83.38          83.38
     RUNOFF COEFFICIENT   =       0.99          0.43           0.64

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
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CN* = 71.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

****
** SIMULATION:7) 25mm Event **
****

CALIB	STANDHYD (0019)	ID= 1 DT= 5.0 min

Area (ha)= 2.21
Total Imp(%)= 6.87 Dir. Conn.(%)= 6.87

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.15	2.06
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	121.48	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	2.07	1.083	5.70	2.083	5.19	3.08	2.80
0.167	2.07	1.167	5.70	2.167	5.19	3.17	2.80
0.250	2.27	1.250	10.78	2.250	4.47	3.25	2.62
0.333	2.27	1.333	10.78	2.333	4.47	3.33	2.62
0.417	2.52	1.417	50.21	2.417	3.95	3.42	2.48
0.500	2.52	1.500	50.21	2.500	3.95	3.50	2.48
0.583	2.88	1.583	13.37	2.583	3.56	3.58	2.35
0.667	2.88	1.667	13.37	2.667	3.56	3.67	2.35
0.750	3.38	1.750	8.29	2.750	3.25	3.75	2.23
0.833	3.38	1.833	8.29	2.833	3.25	3.83	2.23
0.917	4.18	1.917	6.30	2.917	3.01	3.92	2.14
1.000	4.18	2.000	6.30	3.000	3.01	4.00	2.14

				TOTALS
Max.Eff.Inten.(mm/hr)		50.21	4.41	
over (min)		5.00	30.00	
Storage Coeff. (min)		3.78 (ii)	28.39 (ii)	
Unit Hyd. Tpeak (min)		5.00	30.00	
Unit Hyd. peak (cms)		0.25	0.04	
PEAK FLOW	(cms)=	0.02	0.01	0.023 (iii)
TIME TO PEAK	(hrs)=	1.50	1.92	1.50
RUNOFF VOLUME	(mm)=	24.00	4.34	5.68
TOTAL RAINFALL	(mm)=	25.00	25.00	25.00
RUNOFF COEFFICIENT	=	0.96	0.17	0.23

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
YOU SHOULD CONSIDER SPLITTING THE AREA.

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 71.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB	STANDHYD (0020)	ID= 1 DT= 5.0 min

Area (ha)= 0.09
Total Imp(%)= 36.36 Dir. Conn.(%)= 36.36

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.03	0.05
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	23.84	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	2.07	1.083	5.70	2.083	5.19	3.08	2.80
0.167	2.07	1.167	5.70	2.167	5.19	3.17	2.80
0.250	2.27	1.250	10.78	2.250	4.47	3.25	2.62
0.333	2.27	1.333	10.78	2.333	4.47	3.33	2.62
0.417	2.52	1.417	50.21	2.417	3.95	3.42	2.48
0.500	2.52	1.500	50.21	2.500	3.95	3.50	2.48
0.583	2.88	1.583	13.37	2.583	3.56	3.58	2.35
0.667	2.88	1.667	13.37	2.667	3.56	3.67	2.35
0.750	3.38	1.750	8.29	2.750	3.25	3.75	2.23
0.833	3.38	1.833	8.29	2.833	3.25	3.83	2.23
0.917	4.18	1.917	6.30	2.917	3.01	3.92	2.14
1.000	4.18	2.000	6.30	3.000	3.01	4.00	2.14

				TOTALS
Max.Eff.Inten.(mm/hr)		50.21	4.41	
over (min)		5.00	30.00	
Storage Coeff. (min)		1.42 (ii)	26.03 (ii)	
Unit Hyd. Tpeak (min)		5.00	30.00	
Unit Hyd. peak (cms)		0.33	0.04	
PEAK FLOW	(cms)=	0.00	0.00	0.004 (iii)
TIME TO PEAK	(hrs)=	1.50	1.92	1.50
RUNOFF VOLUME	(mm)=	24.00	4.34	11.29
TOTAL RAINFALL	(mm)=	25.00	25.00	25.00
RUNOFF COEFFICIENT	=	0.96	0.17	0.45

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 71.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB	STANDHYD (0021)	ID= 1 DT= 5.0 min

Area (ha)= 2.59
Total Imp(%)= 21.41 Dir. Conn.(%)= 21.41

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.56	2.04
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	131.48	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	2.07	1.083	5.70	2.083	5.19	3.08	2.80
0.167	2.07	1.167	5.70	2.167	5.19	3.17	2.80
0.250	2.27	1.250	10.78	2.250	4.47	3.25	2.62
0.333	2.27	1.333	10.78	2.333	4.47	3.33	2.62
0.417	2.52	1.417	50.21	2.417	3.95	3.42	2.48
0.500	2.52	1.500	50.21	2.500	3.95	3.50	2.48
0.583	2.88	1.583	13.37	2.583	3.56	3.58	2.35
0.667	2.88	1.667	13.37	2.667	3.56	3.67	2.35
0.750	3.38	1.750	8.29	2.750	3.25	3.75	2.23
0.833	3.38	1.833	8.29	2.833	3.25	3.83	2.23
0.917	4.18	1.917	6.30	2.917	3.01	3.92	2.14
1.000	4.18	2.000	6.30	3.000	3.01	4.00	2.14

				TOTALS
Max.Eff.Inten.(mm/hr)		50.21	4.41	
over (min)		5.00	30.00	
Storage Coeff. (min)		3.97 (ii)	28.57 (ii)	
Unit Hyd. Tpeak (min)		5.00	30.00	
Unit Hyd. peak (cms)		0.24	0.04	
PEAK FLOW	(cms)=	0.07	0.01	0.075 (iii)
TIME TO PEAK	(hrs)=	1.50	1.92	1.50
RUNOFF VOLUME	(mm)=	24.00	4.34	8.54
TOTAL RAINFALL	(mm)=	25.00	25.00	25.00
RUNOFF COEFFICIENT	=	0.96	0.17	0.34

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 71.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

```
| CALIB             |
| STANDHYD (  0022)|   Area    (ha)=   3.13
|ID= 1 DT= 5.0 min |   Total Imp(%)=  23.51   Dir. Conn.(%)=  23.51
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.74         2.39
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     144.41        40.00
     Mannings n           =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                        ---- TRANSFORMED HYETOGRAPH ----
               TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
              0.083    2.07 | 1.083    5.70 | 2.083    5.19 |  3.08    2.80
              0.167    2.07 | 1.167    5.70 | 2.167    5.19 |  3.17    2.80
              0.250    2.27 | 1.250   10.78 | 2.250    4.47 |  3.25    2.62
              0.333    2.27 | 1.333   10.78 | 2.333    4.47 |  3.33    2.62
              0.417    2.52 | 1.417   50.21 | 2.417    3.95 |  3.42    2.48
              0.500    2.52 | 1.500   50.21 | 2.500    3.95 |  3.50    2.48
              0.583    2.88 | 1.583   13.37 | 2.583    3.56 |  3.58    2.35
              0.667    2.88 | 1.667   13.37 | 2.667    3.56 |  3.67    2.35
              0.750    3.38 | 1.750    8.29 | 2.750    3.25 |  3.75    2.23
              0.833    3.38 | 1.833    8.29 | 2.833    3.25 |  3.83    2.23
              0.917    4.18 | 1.917    6.30 | 2.917    3.01 |  3.92    2.14
              1.000    4.18 | 2.000    6.30 | 3.000    3.01 |  4.00    2.14

     Max.Eff.Inten.(mm/hr)=      50.21         4.41
               over (min)        5.00        30.00
     Storage Coeff.  (min)=       4.20 (ii)   28.80 (ii)
     Unit Hyd. Tpeak (min)=       5.00        30.00
     Unit Hyd. peak  (cms)=       0.24         0.04
                                                    *TOTALS*
     PEAK FLOW       (cms)=       0.10         0.02          0.099 (iii)
     TIME TO PEAK    (hrs)=       1.50         1.92           1.50
     RUNOFF VOLUME    (mm)=      24.00         4.34           8.96
     TOTAL RAINFALL   (mm)=      25.00        25.00          25.00
     RUNOFF COEFFICIENT   =       0.96         0.17           0.36

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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| CALIB             |
| STANDHYD (  0023)|   Area    (ha)=   0.50
|ID= 1 DT= 5.0 min |   Total Imp(%)=  28.20   Dir. Conn.(%)=  28.20
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                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.14         0.36
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      57.60        40.00
     Mannings n           =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                        ---- TRANSFORMED HYETOGRAPH ----
               TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
              0.083    2.07 | 1.083    5.70 | 2.083    5.19 |  3.08    2.80
              0.167    2.07 | 1.167    5.70 | 2.167    5.19 |  3.17    2.80
              0.250    2.27 | 1.250   10.78 | 2.250    4.47 |  3.25    2.62
              0.333    2.27 | 1.333   10.78 | 2.333    4.47 |  3.33    2.62
              0.417    2.52 | 1.417   50.21 | 2.417    3.95 |  3.42    2.48
              0.500    2.52 | 1.500   50.21 | 2.500    3.95 |  3.50    2.48
              0.583    2.88 | 1.583   13.37 | 2.583    3.56 |  3.58    2.35
              0.667    2.88 | 1.667   13.37 | 2.667    3.56 |  3.67    2.35
              0.750    3.38 | 1.750    8.29 | 2.750    3.25 |  3.75    2.23
              0.833    3.38 | 1.833    8.29 | 2.833    3.25 |  3.83    2.23
              0.917    4.18 | 1.917    6.30 | 2.917    3.01 |  3.92    2.14
              1.000    4.18 | 2.000    6.30 | 3.000    3.01 |  4.00    2.14

     Max.Eff.Inten.(mm/hr)=      50.21         4.41
               over (min)        5.00        30.00
     Storage Coeff.  (min)=       2.42 (ii)   27.02 (ii)
     Unit Hyd. Tpeak (min)=       5.00        30.00
     Unit Hyd. peak  (cms)=       0.30         0.04
                                                    *TOTALS*
     PEAK FLOW       (cms)=       0.02         0.00          0.020 (iii)
     TIME TO PEAK    (hrs)=       1.50         1.92           1.50
     RUNOFF VOLUME    (mm)=      24.00         4.34           9.85
     TOTAL RAINFALL   (mm)=      25.00        25.00          25.00
     RUNOFF COEFFICIENT   =       0.96         0.17           0.39

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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| CALIB             |
| STANDHYD (  0024)|   Area    (ha)=   0.53
|ID= 1 DT= 5.0 min |   Total Imp(%)=  34.09   Dir. Conn.(%)=  34.09
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                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.18         0.35
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      59.35        40.00
     Mannings n           =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                        ---- TRANSFORMED HYETOGRAPH ----
               TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
              0.083    2.07 | 1.083    5.70 | 2.083    5.19 |  3.08    2.80
              0.167    2.07 | 1.167    5.70 | 2.167    5.19 |  3.17    2.80
              0.250    2.27 | 1.250   10.78 | 2.250    4.47 |  3.25    2.62
              0.333    2.27 | 1.333   10.78 | 2.333    4.47 |  3.33    2.62
              0.417    2.52 | 1.417   50.21 | 2.417    3.95 |  3.42    2.48
              0.500    2.52 | 1.500   50.21 | 2.500    3.95 |  3.50    2.48
              0.583    2.88 | 1.583   13.37 | 2.583    3.56 |  3.58    2.35
              0.667    2.88 | 1.667   13.37 | 2.667    3.56 |  3.67    2.35
              0.750    3.38 | 1.750    8.29 | 2.750    3.25 |  3.75    2.23
              0.833    3.38 | 1.833    8.29 | 2.833    3.25 |  3.83    2.23
              0.917    4.18 | 1.917    6.30 | 2.917    3.01 |  3.92    2.14
              1.000    4.18 | 2.000    6.30 | 3.000    3.01 |  4.00    2.14

     Max.Eff.Inten.(mm/hr)=      50.21         4.41
               over (min)        5.00        30.00
     Storage Coeff.  (min)=       2.46 (ii)   27.06 (ii)
     Unit Hyd. Tpeak (min)=       5.00        30.00
     Unit Hyd. peak  (cms)=       0.30         0.04
                                                    *TOTALS*
     PEAK FLOW       (cms)=       0.02         0.00          0.025 (iii)
     TIME TO PEAK    (hrs)=       1.50         1.92           1.50
     RUNOFF VOLUME    (mm)=      24.00         4.34          11.01
     TOTAL RAINFALL   (mm)=      25.00        25.00          25.00
     RUNOFF COEFFICIENT   =       0.96         0.17           0.44

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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| CALIB             |
| STANDHYD (  0025)|   Area    (ha)=   0.26
|ID= 1 DT= 5.0 min |   Total Imp(%)=  37.90   Dir. Conn.(%)=  37.90
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                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.10         0.16
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      41.50        40.00
     Mannings n           =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.
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---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	2.07	1.083	5.70	2.083	5.19	3.08	2.80
0.167	2.07	1.167	5.70	2.167	5.19	3.17	2.80
0.250	2.27	1.250	10.78	2.250	4.47	3.25	2.62
0.333	2.27	1.333	10.78	2.333	4.47	3.33	2.62
0.417	2.52	1.417	50.21	2.417	3.95	3.42	2.48
0.500	2.52	1.500	50.21	2.500	3.95	3.50	2.48
0.583	2.88	1.583	13.37	2.583	3.56	3.58	2.35
0.667	2.88	1.667	13.37	2.667	3.56	3.67	2.35
0.750	3.38	1.750	8.29	2.750	3.25	3.75	2.23
0.833	3.38	1.833	8.29	2.833	3.25	3.83	2.23
0.917	4.18	1.917	6.30	2.917	3.01	3.92	2.14
1.000	4.18	2.000	6.30	3.000	3.01	4.00	2.14

Max.Eff.Inten.(mm/hr)=	50.21	4.41		
over (min)	5.00	30.00		
Storage Coeff. (min)=	1.99 (ii)	26.59 (ii)		
Unit Hyd. Tpeak (min)=	5.00	30.00		
Unit Hyd. peak (cms)=	0.31	0.04		
			TOTALS	
PEAK FLOW (cms)=	0.01	0.00	0.014 (iii)	
TIME TO PEAK (hrs)=	1.50	1.92	1.50	
RUNOFF VOLUME (mm)=	24.00	4.34	11.72	
TOTAL RAINFALL (mm)=	25.00	25.00	25.00	
RUNOFF COEFFICIENT =	0.96	0.17	0.47	

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 71.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB		
STANDHYD (0026)	Area (ha)=	0.73
ID= 1 DT= 5.0 min	Total Imp(%)=	36.77 Dir. Conn.(%)= 36.77

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.27	0.46
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	69.58	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	2.07	1.083	5.70	2.083	5.19	3.08	2.80
0.167	2.07	1.167	5.70	2.167	5.19	3.17	2.80
0.250	2.27	1.250	10.78	2.250	4.47	3.25	2.62
0.333	2.27	1.333	10.78	2.333	4.47	3.33	2.62
0.417	2.52	1.417	50.21	2.417	3.95	3.42	2.48
0.500	2.52	1.500	50.21	2.500	3.95	3.50	2.48
0.583	2.88	1.583	13.37	2.583	3.56	3.58	2.35
0.667	2.88	1.667	13.37	2.667	3.56	3.67	2.35
0.750	3.38	1.750	8.29	2.750	3.25	3.75	2.23
0.833	3.38	1.833	8.29	2.833	3.25	3.83	2.23
0.917	4.18	1.917	6.30	2.917	3.01	3.92	2.14
1.000	4.18	2.000	6.30	3.000	3.01	4.00	2.14

Max.Eff.Inten.(mm/hr)=	50.21	4.41		
over (min)	5.00	30.00		
Storage Coeff. (min)=	2.71 (ii)	27.31 (ii)		
Unit Hyd. Tpeak (min)=	5.00	30.00		
Unit Hyd. peak (cms)=	0.29	0.04		
			TOTALS	
PEAK FLOW (cms)=	0.04	0.00	0.037 (iii)	
TIME TO PEAK (hrs)=	1.50	1.92	1.50	
RUNOFF VOLUME (mm)=	24.00	4.34	11.54	
TOTAL RAINFALL (mm)=	25.00	25.00	25.00	
RUNOFF COEFFICIENT =	0.96	0.17	0.46	

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 71.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
